

The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

VOL. II.

JUNE 19, 1920

No. 53

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Other communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to "The Chemical Age" is 21/- per annum for the United Kingdom, and 26/- Abroad. Cheques, P.O.O.'s, and Postal Orders should be payable to Benn Brothers, Ltd.

Editorial & General Offices—8, Bouverie Street, London, E.C.4. Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (4 lines).

Principles of Chemical Training

THE proposals for creating efficient chemical services for India have already been considerably discussed, and in so far as they threaten bureaucratic control over science, rather severely criticised. It is not intended now to go fully into this large problem, but merely to note some interesting points in Professor J. F. Thorpe's introduction to the official report of the departmental committee appointed "to formulate proposals for the organisation of a chemical service for India and for the location and equipment of research laboratories." During his tour Professor Thorpe very early reached the conclusion that the development of the chemical industries of India could only be adequately realised through the agency of an efficient Government chemical service. Very few of the great natural resources of the country were being exploited to advantage, and even where this was attempted the processes employed were crude and wasteful. If, however, the resources of the country were developed

to their fullest extent, Professor Thorpe has no doubt that India would take her place in the front rank of industrial communities and would benefit by all the advantages that this implies. On this point there will be no doubt or division of opinion. The Provinces of India appreciate the fact, but none has yet formulated a programme of their requirements or decided what educational methods are needed, and it is this that convinces Professor Thorpe of the necessity for Government action if the problem is to be adequately dealt with.

While travelling in India Professor Thorpe was impressed by the need of technological institutes, though he prefers to call them trade schools, because in them men of the foremen type may receive instruction in the technique of their trades. The difference, he remarks, between a pure and an applied chemist is relative only, and a chemist whether he intends to devote his life to academic or to industrial pursuits must first receive a thorough training in his subject by taking a recognised course, such as that at an Honours School in a British University. Even then he considers that the dividing line between pure and applied chemistry has not been reached, but one or two years' subsequent training in methods of research, coupled with instruction in the principles of engineering and machine drawing, is necessary for both the academic and the industrial chemist. After such training the chemist should be in a position to turn his hand to anything chemical.

Another point of interest is Professor Thorpe's conviction that true chemical "technological" training cannot be imparted without actual works experience. He regards the chemist who has obtained an Honours degree in his University as no more proficient than a medical man would be without hospital experience, or an engineer without knowledge of workshop practice. In one Indian University the suggestion was made to him that post-graduate students should be drafted to some chemical works in order to gain factory experience. He is a little doubtful how this would work, because the only student of his own who tried it, although he attended a prominent factory for a year, was not allowed to learn anything of the processes carried out there, and spent his time in routine work in the research laboratory. Although Professor Thorpe recognises the impossibility of having laboratories attached to Universities fitted with full scale apparatus, he considers it quite possible to erect a laboratory of comparatively small dimensions containing types of every kind of plant used in chemical manufacture, of about one-sixtieth the size of the large scale plant. A laboratory of this kind should, in Professor Thorpe's judgment, be attached to the chemical department of every university.

The Quality of Sulphate of Ammonia

It is a generally recognised fact that in the years prior to the war the British producer of sulphate of ammonia did little to attract his customers. There was invariably a steady market for export; and, providing that the salt was of a good commercial grey colour, the middlemen in this country rarely insisted on anything more. The producers, therefore, very naturally turned out a class of salt which was most easily manufactured by the plant at their disposal, and which avoided anything in the way of complications. The result was that the average sulphate was comparatively low-testing ($24\frac{1}{2}$ per cent. of ammonia), and contained approximately 3.0 per cent. of moisture and 0.4 per cent. of free acid. Germany, meanwhile, with her usual attentiveness to detail, had developed processes for the production of an acid-free salt, and there can be no doubt that purchasers—particularly those in Eastern markets—were beginning to recognise more fully that the quality of sulphate cannot be gauged by its colour alone. During the war, when the home consumer began to use sulphate as a fertiliser in greater quantity than ever before, the producers made an effort to progress with the times, with the result that many can now give a guarantee of 25 per cent. of ammonia and perfect acid-freedom. It may be asked why, when so much has been done to improve the quality of sulphate, there are so many producers who continue to work on the old lines? The answer is, of course, that so long as there is a demand for the low-testing acid salt so long will it be made by those who prefer not to be troubled with the modification of their plant, a consideration which applies particularly to the large number of lesser manufacturers such as the smaller provincial gasworks.

Those who are interested in the subject would do well to study the article of Mr. J. T. Sheard, which we published last week. It has often been said that the tendency of sulphate of ammonia to retain moisture is largely dependent upon the free acid which it contains, that free acid attracts moisture, and that so long as it is present dry salt cannot be obtained. Mr. Sheard considered that this belief was open to criticism, and he carried out a series of careful experiments to prove his point. In the end he concluded that sulphate of ammonia, whether containing 0.5 per cent. of free acid, 0.16 per cent., or none whatever, absorbs moisture from the atmosphere with equal avidity. It is, in fact, a very sensitive indicator of the hygrometric condition of the atmosphere.

Sir Arthur Duckham and Labour

In his presidential address to the annual meeting of the Society of British Gas Industries in Sheffield, on Tuesday, Sir Arthur Duckham dealt with the important question of "Labour's position in industry." While his tone towards labour was friendly and sympathetic, he pointed out quite frankly certain weaknesses in its position. Especially he showed by figures that the popular axiom that shorter hours must result in an increased output per hour was proving a fallacy. The theory is no doubt good, in so far as it means that a worker in perfectly fit condition mentally and physically should be more efficient than one overworked,

underfed, and indifferently educated. But the good effects one would naturally expect from it are being neutralised by the unwritten but no less operative law that all workers must be reduced to a standard and a very low pace. We have more than once pointed out the sterilising effect of this policy on the initiative and ambition of a worker really interested in his craft, and its tendency on the one side to produce a poor and indifferent type of craftsman, and on the other to limit national output when it is of urgent importance that it should be developed. Comparing the years 1914 and 1919, Sir Arthur Duckham found that the output per man per hour in 1919 was about 70 per cent. of the 1914 figure. To-day, he suggested, the position was still worse, the proportion having declined to about 60. If these figures are correct, they reveal a very serious position, and one which promises no improvement in the industrial and economic position of the world.

As to remedies, Sir Arthur Duckham offered several suggestions—greater co-operation between employers and workpeople, a more equitable division of benefits, a larger measure of control of industry by the workers, industrial parliaments, &c. These are all good, but his most concrete proposal was one for paying the workers in three stages—first a subsistence wage, to be uniform for every class of worker in the area; next an ordinary standard wage, varying according to the grade and skill of the worker; beyond this some system of payment by results. It seems to us that here Sir Arthur comes very close to the real problem. The trade union principle of providing every worker with a minimum is humane and sound; but it has been overdone in bringing all down to one level, in exalting a purely protective or defensive device against excessive hours into a principle, almost into a sacrament, and in eliminating from the minds of the very best class of craftsmen the motive to excel. The searching examination of trade union principles which is now going on will presently reveal the one-sided and short-sighted views on which many of them are based, and show that labour in the end will gain more by working for and sharing in the common good than by selfishly playing for its own hand.

New Sources of Paper Pulp

WE recently expressed the opinion that only research and organisation were necessary to overcome the present world-shortage of paper, and that with the aid of the chemist, pulp could be obtained from many other sources than timber. The bamboo has already been quoted by some authorities as a suitable and abundant raw material. It is now announced that successful experiments have been carried out at Para with the fibres of a plant known as aninga, which grows freely in the marshy districts of South America. The valuable qualities of the fibre as a source of cellulose were already known 10 years ago, but the rapid development of the rubber trade has distracted attention from it.

The chief advantages claimed for the aninga product are that the abundance of the crops, and, above all, the comparatively simple treatment necessary, will enable manufacturers to supply the paper pulp at a lower rate than that charged by Norway, or any other

European country. It is said that the quality of the cellulose is very good and that the yield of paper is 20 per cent. greater than from Norwegian pulp. One prominent Brazilian chemist asserts that the aninga fibre can be treated so as to give a product superior to cotton, inasmuch as the filaments of the latter under the microscope appear twisted, while the Brazilian fibres are quite straight. The plant gives one good crop every year, and will grow readily in any district where the water is sluggish. It is estimated that it would be possible to export at least 150,000 tons of aninga cellulose per annum, the value of which would be comparable with the value of the rubber which is now exported from Para, and might possibly soon become of even greater importance. In the need for an enormously increased paper output there is a new field of great scope for combined chemical and commercial enterprise.

The fact that Nature contains somewhere all the raw material needed for the paper industry should not exclude the commercial and other factors that must be taken into account. These include such questions as water supply, power, transport, labour, and many others, and the co-operation between chemist, engineer, and business men needs to be supplemented by suitable natural conditions. The development of the Shawinigan pulp industry is a good example of this collective equipment. Further, it is a mistake to speak of "substitutes" for wood pulp. The extended market for paper throughout the world will absorb all the wood pulp that can be produced for some time to come. What we need are not substitutes, but supplemental supplies.

Endowment of Research

THE study of biochemistry, a comparatively young branch of research, the importance of which is increasingly recognised, will be enormously advanced by the princely donation to Cambridge University of £165,000 by the Commercial Union Assurance Co., as trustees under the will of the late Sir William Dunn. The trustees are to be congratulated on their wise and generous use of their discretion in the matter, and the University no less on its good fortune in receiving so welcome a gift. In the United States the habit of making these large benefactions to education is a little more common than here, but in England, fortunately, it is growing, and it is strengthened by such gifts as that just made to Cambridge.

Although at present biochemistry has no direct bearing on industry there is no limit to its possible developments, and it is a branch of research which this country can ill afford to neglect. At the moment, for example, a new development seems to be at hand for micro-organisms. Bacteria yeasts have for centuries been employed for the production of our wines and beers, and of the alcohol which has so many uses in industry, but the chemical activities of micro-organisms are exceedingly diverse, and in the future they will be employed to produce many products of importance besides alcohol. Some of them, again, are at present a menace to mankind, it may be because we are so ignorant of their real character and, indeed, of their existence; but it is certain also that multitudes of them already are benevolent in their action, and

ways may be found of harnessing them for service. Again, in the field of agriculture, we are only beginning to realise the enormous effects of bacterial activity, and the importance of understanding it so as to be able to direct and apply it in the most beneficial way. Anything, therefore, that guarantees a more efficient study of biochemistry is heartily to be welcomed, and it is appropriate that this handsome gift should go to Cambridge because there the study had its beginning in this country and is being continued under the charge of Professor Gowland Hopkins.

Canadian Chemical Products

THOUGH the Canadian Industries Exhibition in the Agricultural Hall, London, which closed on Thursday, was a modest adventure, and the chemical section was limited to the products of a handful of chemical firms, the experiment was promising as a beginning, and may lead to something more representative in the future. The principal chemical exhibit was shown by Shawinigan, Ltd., for whom Messrs. Boake, Roberts & Co. act as the United Kingdom distributors, and whose establishment of offices in Tudor Street, London, has, we are glad to learn, quite justified itself. The Shawinigan Company and those associated with it in the production of acetic acid, acetone, calcium carbide, &c., have built up a plant of an extensive character at Shawinigan Falls, and supported by commercial enterprise, scientific and technological work of a high class, and favourable natural conditions, now rank among the great chemical concerns of the Empire. The exhibit will help to bring this fact home to the British dealer and to interest him generally in Canadian resources and enterprise. Other exhibitors at the Exhibition included the Imperial Varnish & Colour Co., Ltd., Toronto; the Standard Chemical, Iron & Lumber Co., Canada (acetone oil, formaldehyde, crude acetic acid, methyl alcohol, &c.); the Basque Chemical Co., of British Columbia (natural Epsom salts), represented by Hill, Seddon & Co. (Canada), Philpot Lane, London; the Canadian Bronze Powder Works, Ltd., of Montreal; Canadian National Railways; and Dominion Industries, Ltd.

The Calendar

June		
22	London University: "The Bio-Chemistry of Sterols," by Mr. J. H. Gardner. 5 p.m.	Physical Laboratory, London University, South Kensington, London.
24	Royal Society: Papers by Sir Ray Lankester; Lord Rayleigh; A. Mallock; E. F. Armstrong; H. Jeffries.	Burlington House, Piccadilly, London.
24	Oil and Colour Chemists' Association. Demonstrations by A. E. Bawtree. 7.30 p.m.	Food Reform Club, 2, Fumival Street, London.
25	Physical Society of London: Papers by J. H. Vincent; W. H. Wilson and Miss Epps; J. Guild; S. Butterworth. 5 p.m.	Imperial College of Science, Imperial Institute Road, South Kensington, London.
28	"Emploi des metaux ammoniums en Chimie Organique," by Professor P. Lebeau. 5 p.m.	King's College, Strand, London.
30	"L'Œuvre Scientifique d'Henri Moissan," by Professor P. Lebeau. 5 p.m.	King's College, Strand, London.

Industrial Applications of Liquid Air and Oxygen—III

By "Ergo"

In his final article our contributor deals with the use of liquid air in mine rescue work and aeronautics and explains the process of manufacture.

Mine Rescue Apparatus

Liquid air has been successfully used for mine work for enabling rescuers to breathe when passing through toxic gas. The most successful apparatus employed in this country up to the present is that known as the "Aerophor," designed by Colonel W. C. Blackett, of the Northumberland and Durham Mine Rescue Association.

In this apparatus, Fig. 5, a receptacle A, holding a charge of 8 lb. or 10 lb. of liquid air (which in practice always contains more than 60 per cent. of oxygen), is carried,

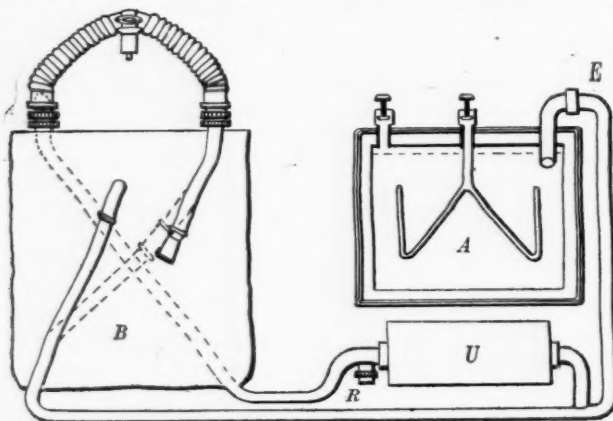


FIG. 5

together with a purifier U, on the wearer's back, while the breathing bag B is at the front. To prevent the wearer from being affected by the extreme cold of the pack, the canvas jacket which supports the apparatus is padded at the back with felt, and an air space is left between the padding and the pack. The absorbent material within the metal receptacle is asbestos wool; and liquid air, forced in through the central opening at the top of the pack, is spread rapidly and uniformly in the wool. This enables the pack to be charged in one minute. Liquid air is poured in from a large metal container, the amount of the charge being measured by suspending the pack from a spring balance. The receptacle is insulated by kieselguhr, felt, and a final cover of leather. This insulation permits the penetration of sufficient heat to volatilise the liquid air at the required rate.

During the earlier part of the period of use the volume of volatilised air passing out of the tube E is more than enough to supply the wearer's requirements. The current at this stage divides at the point J, one part going to the lungs and the other passing to waste through the purifier U and an automatic relief valve R, through which the exhaled air also passes. Later in the period, when the evaporation is less rapid, the lungs can only get the volume they call for by rebreathing a portion of the exhaled air. The flow in the purifier now reverses; the apparatus becomes a regenerator, and the purifier removes the CO_2 and moisture from the part of the exhaled air returning to the bag. The ends of the tubes within the bag form a plug-and-socket connection, allowing them to be joined (as indicated by the dotted lines of Fig. 5) should the bag be torn during use. An attachment, consisting of a flexible tube, ending in a mouthpiece and relief valve, may be connected to the valve R to supply air to another man during the first part of a two hours' interval.

Other Medical Uses

On account of the great advantage in weight of liquid over compressed oxygen apparatus, it is especially useful for supplying aviators with the additional oxygen which is required when flying at great altitudes. During the war it was found that much less fatigue was noticeable in tests under medical supervision with airmen flying at high altitudes. At a comparatively early stage in their air-raid offensive the Germans carried liquid oxygen apparatus on their aeroplanes and Zeppelins, and tests made in this country showed that the liquid type of apparatus gives very successful results, particularly on long flights. It seems probable that in all future equipment of aircraft for war purposes liquid oxygen apparatus will be included; the contention that oxygen has a "doping" effect upon its users appears on medical evidence to be quite without foundation.

For ordinary medical purposes liquid oxygen apparatus can be employed in all cases in which the gaseous or high-pressure apparatus is now used. Its great advantage in weight, previously discussed in detail, is a matter of importance where considerable quantities are required.

Manufacture of Liquid Oxygen

The general principle underlying the manufacture of liquid air is the compressing of air to pressures varying from 40 to 200 atmospheres; it is then cooled and allowed to expand, either by driving an expansion engine or by passing through a narrow orifice. This causes the air to be cooled, and the cooled air, passing round the incoming compressed air, causes it to arrive at the expansion device in a cooled condition. The process goes on until the air becomes so cold that it liquefies. In modern plants for producing liquid of high oxygen content, gaseous oxygen being now usually made in commerce by first making pure liquid oxygen, the liquid is automatically caused to boil off, so as to drive off the nitrogen which is collected. The satisfactory working of a liquid oxygen plant involves attention to technical points of considerable importance, and a number of different processes varying by apparently small differences have been employed.

The Claude Process

In the Claude process, which is shown in diagrammatic form in Fig. 6, the compressed air at a pressure of 40 atmo-

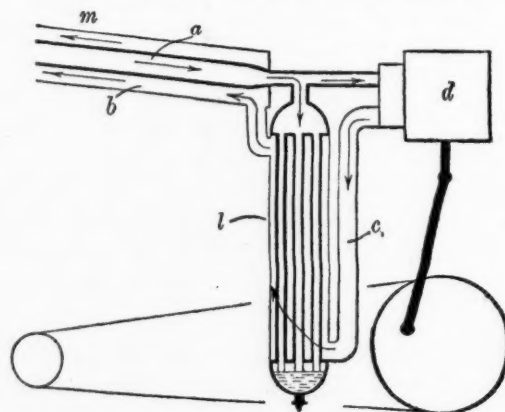


FIG. 6.

spheres passes through the union tube a of the "heat-exchanger" m to the expansion machine d. The expanded

and cooled air then passes upwards round the outside of the tubes of the "liquefier" *l*. These tubes are supplied with the compressed air at 40 atmospheres pressure from the tube *a*. This compressed air is thus progressively cooled by the expanding gases circulating upwards until the temperature of liquefaction at that temperature—about -140°C .—is reached.

Liquefaction then commences in the tubes, the liquid collecting in the bottom of the liquefier, from which it can be run off by means of a cock. The expanded gas passes round the tubes of the liquefier, and thus attains the temperature of liquefaction of the compressed gas; it then passes into the outer tube *b* of the exchanger, and thus cools the incoming compressed gas, which, therefore, reaches the expanding machine at this temperature. In this way it is ensured that the initial temperature of expansion does not fall so low that the expansion of the gas will not cause liquefaction. In order that this temperature should remain at the desired height, the liquid formed in the liquefier must be run off periodically.

Claude obtained an output of about 50 litres per hour per 60 horse power, but a number of detail improvements in the process and apparatus have been made in recent years.

Rectification of Liquid Air to Give Liquid Oxygen

The rectifying column shown in diagrammatic form in Fig. 7 is employed to separate out the nitrogen from the oxygen liquid air. The cooled and purified air enters the lower part of the apparatus at a pressure of about 5 atmospheres and rises through a series of vertical pipes *P* surrounded by liquid oxygen, where it is partially liquefied.

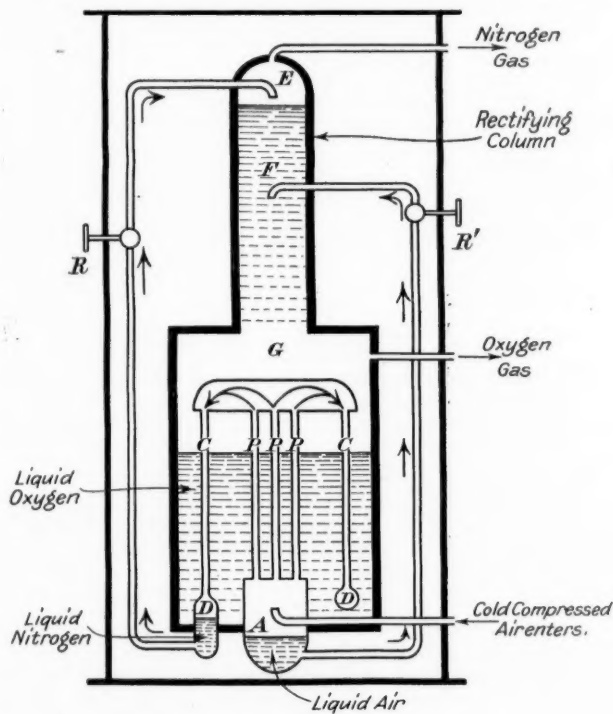


FIG. 7.

The liquid containing about 47 per cent. of oxygen and 53 per cent. of nitrogen drains into the lower vessel *A*. The vapour which has survived condensation enters the chamber *B* and then descends through a ring of pipes *C* arranged concentrically about the pipes *P*; here all the gas is liquefied and the liquid which collects in the vessel *D* is very rich in nitrogen. The pressure drives this liquid up the pipe to

the top *E* of the rectifying column, which then trickles down over trays or perforated plates; the liquid air from the vessel *A* is similarly driven up its pipe and enters the column at the point *F* lower down, the pressures and rates of flow being governed by valves *R*, *R*¹. The liquid nitrogen is 3° or 4° lower in temperature than the liquid rich in oxygen, and the nitrogen evaporates from the down-streaming liquid, and oxygen condenses from the up-streaming gases. The latent heat supplied by the condensation of oxygen helps on the evaporation of the nitrogen, so that the descending liquid becomes progressively richer in oxygen, and the ascending gases richer in nitrogen. The liquid oxygen drains out the receptacle *G* and may be drawn off from time to time.

Testing the Oxygen Content of Liquid Air or Oxygen; Baly's Curves

In dealing with liquid air it is important to remember that the percentage of oxygen contained in the liquid will not be the same as the percentage of oxygen contained in

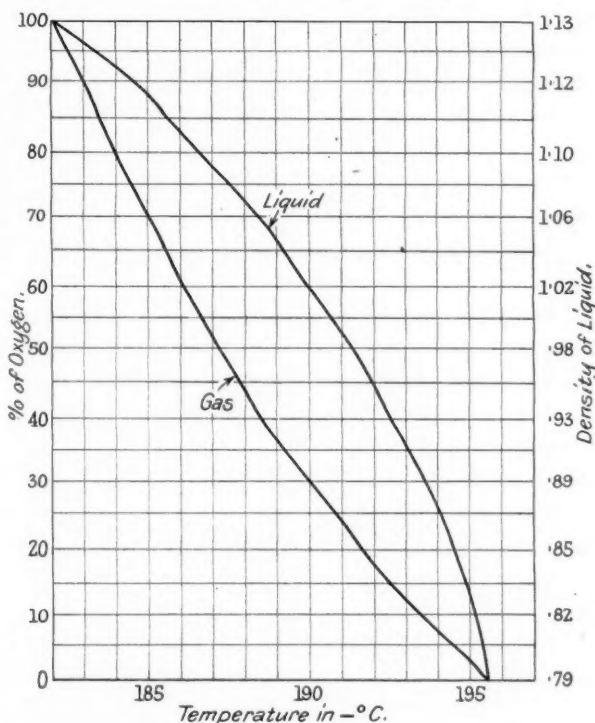


FIG. 8.

the gas given off from it when evaporating slowly under normal conditions. The relation between the two is given in Baly's curves which we show in Fig. 8. To find the percentage of oxygen in the gas given off from liquid with a given percentage of oxygen we run in horizontally from the left-hand scale at this percentage until we meet the "liquid" curve. We then drop vertically downwards until we meet the "gas" curve, and finally run out again horizontally to the left-hand scale. If, for example, we have liquid oxygen containing 70 per cent. of oxygen, it will be found that the corresponding gas contains about 41 per cent. of oxygen. When, however, the liquid is quickly evaporated in small portions as in the vaporiser, which we have already described, the percentage of oxygen in the gas will be more than Baly's curves indicate. Fig. 8 also gives useful data with regard to densities and temperature.

To determine the oxygen content of liquid, the usual procedure is to analyse a sample of gas given off from it

means of an Orsat or similar apparatus and to deduce the oxygen content of the liquid by means of Baly's curves. An approximate method which has the advantage of simplicity consists in measuring the density of the liquid by means of an hydrometer and deducing the oxygen content from the density.

Reviews

CHEMISTRY FOR PUBLIC HEALTH STUDENTS. By E. Gabriel Jones, M.Sc., F.I.C. London: Methuen & Co., Ltd., 1920. 6s.

This book is compiled from the note-sheets and notes of lectures provided for students preparing for the diploma in public health at the University of Liverpool. It does not differ essentially from the numerous books which have appeared in recent years covering the same ground, but is brought up to date by the inclusion of a useful list of Government and other reports bearing upon food regulations and analysis. Some of the difficulties of wartime legislation are not referred to; thus, in the index we find bread, white, p. 82, but in the text there is no mention of any sort of bread, but a reference to the Cocoa Powder Order of 1918, which does not deal with the analytical difficulties of this order. Similarly, "sausages" and potted meats are not to be found either in the index or the text. On p. 92 we read that the chemical preservatives most commonly used are formaldehyde in milk, whereas on p. 94 the recommendation of the Departmental Committee of 1901 that the use of formaldehyde be absolutely prohibited is quoted at length, and on p. 95 the Milk and Cream Regulations of 1912 prohibiting the addition of any preservative to milk is duly noted.

A chapter is devoted to water and one to sewage effluents, which gives the recommendations of the 8th report of the Royal Commission on Sewage Disposal and the methods for determining the dissolved oxygen in rivers and effluents, but no reference to the dissolved nitrogen content which, as the chemical advisers to the Royal Commission have shown, throws considerable light on the purification changes which take place in water-borne sewage. The chapter on air refers to the report of the Committee appointed for the investigation of atmospheric pollution in 1916, but does not describe the apparatus employed by this Committee nor the standards which one hopes will be adopted for ensuring an improvement in town air.

Chapter XI, on disinfectants, is disappointing. These are divided into three classes: (1) oxidising agents; (2) reducing agents; and (3) corrosives and coagulants of albumen. In the last category we find formaldehyde, which is thus not a reducing agent, and also a variety of unnamed proprietary disinfectants. No bacterial tests are even referred to, so that students have no details of methods for determining their relative germicidal values.

The book concludes with an appendix of the usual tables, and examination questions from papers set for various diplomas in public health.

S. R.

SOUTH WALES COALS: THEIR ANALYSES, CHEMISTRY AND GEOLOGY. By Llewellyn J. Davies. Pp. 101. Business Statistics Co., Ltd., Cardiff. 10s. 6d. net.

Current interest in matters relating to the allocation for export of available supplies of coal imparts immediate interest to this publication, which gives exhaustive details of the various coals and coke produced in the South Wales district. This coal field produces the most concentrated of our natural coal fuels, and, for that reason, and the consequent saving in freight and tonnage, the Welsh anthracitic coals are probably the most attractive to foreign importers.

The proximate analyses, sulphur content and calorific power (expressed in calories and B.Th.U.) of a large number of various kinds of coal, both bituminous and anthracitic, are given, and, for the benefit of those who for special purposes require coal possessing certain chemical characteristics, complete ultimate analyses are in many cases also given. The book presumably is designed primarily for the use of the foreign importer and the exporter, but manufacturers and engineers will find in it much valuable information bearing upon the selection, purchase and use of fuel. The trade

descriptions of the various coals are based largely upon place names, such, for example, as Ystradgynlais, Cwmaucgurwen and Ynisedwyn. The foreigner no doubt would prefer shorter code word indicators for his requirements; but incidentally the publication of this book tends to emphasise the growing necessity for a complete survey of the country's fuel resources, and their classification on the basis of their chemical and other special characteristics.

Chapters XIII. to XVI. deal briefly with metallurgical coke, and so-called "patent" fuel, sampling and analysis of coal; the interpretation of analyses and the purchase of coal on the bases of its calorific power and analysis. The final chapters dealing with geology, spontaneous combustion, boiler and steam plant, hand and mechanical stoking, give much interesting and useful information in the most concise form.

E. W. L. N.

The Chemist's Introduction to Works

To the Editor of THE CHEMICAL AGE

SIR,—Having read with interest your article of May 29 last on "The Chemist's Introduction to Works," I should be glad to know if any steps are being taken in this matter by chemical manufacturers. The suggestion that students of chemistry should be employed by them during the long vacation seems to me a perfectly sound one, which would benefit all concerned.

From a study of the "Vacancy" columns of scientific journals, one notices that *experience* is an essential qualification on the part of the applicant, but in the case of a student leaving college such experience is hard to come by. Many present students, no doubt, have during the war acquired valuable experience in munition works, but there are others, like myself, whose services were requisitioned elsewhere, leaving us, through no fault of our own, at a disadvantage when considered as applicants for a position in a works laboratory.

The majority of us would, therefore, I think, welcome such an opportunity of obtaining an insight into the methods employed in the profession we propose to adopt, and such an insight as cannot, for obvious reasons, be obtained in a college, however well equipped. At a training college for teachers, for instance, a certain amount of actual teaching in schools has to be done before a certificate can be obtained, and why should a chemist who seeks to obtain some recognised qualification before obtaining a post be thus at a disadvantage?—I remain, &c.,

Dr. Williams' Library,
Gordon Square, W.C. 1.
June 12, 1920.

L. R. TAYLOR.

Coal Tar Distillation in Australia

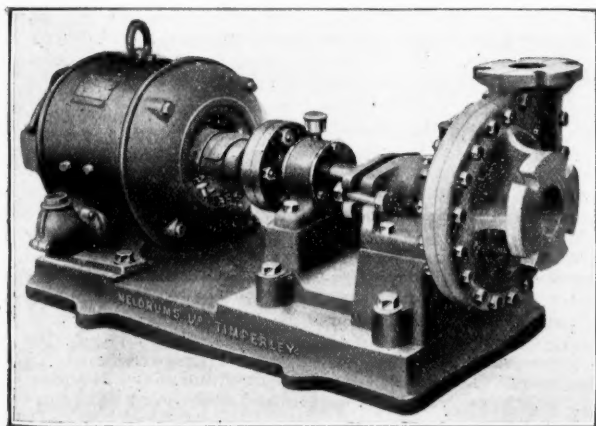
THE Melbourne & Metropolitan Gas Company, which carbonizes annually from 250,000 to 300,000 tons of coal, is considering plans for the installation of an extensive distillation plant for the recovery of benzol and other valuable by-products of coal-tar which now run to waste.

The cramped condition of the company's works, situated in densely populated industrial districts, is, a *Times* correspondent states, an obstacle in the way of proceeding with the enterprise immediately, but it is thought that the State government will probably make available a suitable area on the Yarra river-front. The Melbourne company has been induced to take action by reason of the success of the by-products installations of the Australian Gaslight Company in Sydney. From the tar-product of gas-making the Sydney company recovers large quantities of ammonia sulphate, benzol, liquid fuel, motor spirit, toluene, solvent naphtha, naphthalene and pyridene. Some of the oils obtained by distillation are sold for liquid fuel and others are disposed of to manufacturing concerns which use them in the making of disinfectants. The plant cost £40,000 and at present it treats only 200,000 tons of the 400,000 tons of coal used annually by the company, but nevertheless the revenue produced from the by-products is about £140,000 a year. In addition to other products the company now recovers 30,000 gallons of benzene and toluene, for conversion into motor spirit, per year, 150,000 gallons of oils for disinfectant manufacture, 30 tons of crude naphthalene and 400,000 to 500,000 gallons of liquid fuel.

Chemical Liquor Pumping

Some Notes on the Sunturbo-Meldrum Pump

THE problem of satisfactorily handling acid and other chemical liquors does not seem to have received in this country the attention that the large demand for apparatus of this kind warrants. The injector or so-called acid egg and the crude type of pot or earthenware pump have never satisfactorily or efficiently met the need, and it is, or was, perhaps, mainly the lack of knowledge of a metal or alloy that would satisfactorily withstand the action of acid liquors and strong acids that prevented pump-makers in this country from putting on the market a pump of standard design, but suitable for pumping acids. The few pumps on the market for this purpose were



really more in the nature of agitators than pumps, and often had a low efficiency. In many cases the reason for this absence of efficient rotary pumps for dealing with acids was the fact that the modern trend in design was to make these pumps such complicated machines, with their fine running clearances and fine blade tips, guides and cutwaters, as to be unsuitable for manufacturing in any of the known acid-resisting metals or substances, which in most cases were too brittle or so hard as to be unmachinable.

With the invention of the Sunturbo Pump, which it is proposed briefly to describe, the building of high efficiency pumps to deal with acids and other trade liquors was greatly simplified. In its rotary movement the Sunturbo-Meldrum pump differs widely from the common centrifugal type of pump, in so far as it possesses a greater range of adaptability. It is of far simpler design, and is capable of running at higher speeds, and over much wider ranges of speeds.

In the construction of the Sunturbo-Meldrum pump the use is dispensed with of vanes, guides and cut-waters used in ordinary centrifugal and turbine pumps, in the outer casing in which the rotating member works. Thus the objections frequently raised against the adopting of centrifugal pumps can no longer be upheld, for there can be no wear of the vanes and cut-waters, nor a falling-off of efficiency due to the members failing. This object has been achieved in designing the rotating member or impellor on what is known as the Venturi Law, which is one of the oldest and best-known principles governing the flow of hydraulic fluids. The Venturi Law may be defined as follows:—

"When water flows through a closed channel of diminishing cross-sectional area, the velocity increases as the area diminishes, and the lateral pressure on the sides or walls of the channel is diminished, and at the maximum velocity is reduced to a minimum. Exterior to this point the channel or passage opens out, the area increasing very rapidly, so that the velocity obtained is converted into pressure with a very slight loss due to fluid friction, and an absence of wear due to the fact that at the point of highest velocity, where wear in the ordinary way is greatest, the lateral

pressure is so reduced that friction and wear become so slight as to be negligible. In other words, the kinetic and pressure or potential energies of the water are interchangeable."

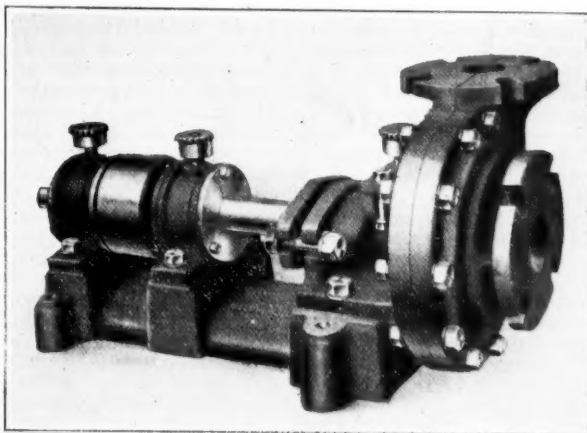
In the Sunturbo impellor this principle is applied in a very simple fashion. The casing in which the impellor rotates is entirely devoid of any obstruction to the free delivery of the liquid from the impellor. The necessary conversions of kinetic and potential energies are brought about within the impellor itself.

The chamber in which the impellor rotates is of large capacity and the water passing through this chamber is, therefore, quiescent, its velocity having been converted into pressure within the impellor. It will be seen, therefore, that by the adoption of a known hydraulic law, it has been found possible to design a pump with fewer working parts, and having hydraulic conversion as nearly perfect as is possible. It is claimed for the Sunturbo-Meldrum pump that it has as high an efficiency for dealing with acid and corrosive liquors as the ordinary water pump, owing to the fact that no change or alteration in design is made.

For dealing with liquids such as strong sulphuric acid at 1.2 sq. gr., nitric acid at 1.2 sq. gr., acetic or oxalic acid at 25 per cent., tartaric acid at 25 per cent., or iodine at 10 per cent., either hot or cold, the impellor of the pump is made of "Meldrum" metal, which is capable of withstanding any action other than a very slight surface oxidation, which seems to form an adherent film, which would appear to act as a protective coating against further action. The shaft is also made of "Meldrum" metal, and may in large sizes have a steel core, the casing and cover being made of either "Meldrum" metal, acid bronze, or regulus metal, depending on the duty of the pump.

This pump is self-regulating, and as far as can be is "fool proof." It can be started up with valves open or closed without any risk of damage or overload to the driving motor or engine. The Sunturbo-Meldrum pump is designed to handle large or small volumes of chemical liquors, including nearly all the acids, with an efficiency second to none when compared with the most efficient pumps dealing with ordinary water.

Another feature peculiar to this pump is that impellers of different diameters can be used in the same casing to give



widely different volumes without in any way impairing the efficiency and duties. This is a very valuable asset if a pump is moved from one location to another and is required to deal with different acids, volumes and lifts. For hydrochloric acid the pump is modified somewhat and made in ebonite.

The confident claims made for this pump are of particular interest to the chemical industry generally, and the results realised have been made possible by the combination of Sunturbo design and the well-known acid-resisting properties of "Meldrum" metal.

A. B. S.

Brunner, Mond & Co.

Chairman's Review of the Year's Developments

THE annual general meeting of Brunner, Mond & Co., Ltd., was held at the Exchange Station Hotel, Liverpool, on Wednesday, Mr. Roscoe Brunner (chairman of directors) presiding over a large attendance.

In moving the adoption of the report and accounts, Mr. Brunner stated that the capital had been slightly increased this year by the issue of shares to the former shareholders of the Buxton Lime Firms Co., Ltd. On account of the book profit on the sale of the Crosfield and Gossage shares to Lever Brothers, the directors had instituted a new account—the investment surplus reserve account—to which they had placed £2,100,000. £500,000 of this they had placed to depreciation account, and to this had been added £150,000. They had decided to adopt the usual procedure of keeping a depreciation account, instead of, as in the past, placing large sums to suspense account. The suspense account now stood at the written down figure of approximately £35,000. The total assets showed an increase of £2,750,000, and the cash position was better by over half a million than at the same time last year. The net profit was up £117,000 on last year. The debts owing to the company were £600,000 more than last year, but this was mainly due to increased trading. They proposed a preference dividend at the rate of 7 per cent, per annum, less income tax, and an ordinary dividend at the rate of 11½ per cent, per annum, less income tax.

Recent Acquisitions

In January last we concluded an agreement with the shareholders of the Castner-Kellner Alkali Co., Ltd., whereby we undertook to exchange two ordinary shares in our company for one ordinary share of that company. We now hold practically 91 per cent. of the total capital of that company.

In February last we concluded an agreement with the shareholders of the Electro Bleach & By-Products, Ltd., whose works are at Middlewich, in Cheshire, close to our own Middlewich works, whereby we undertook to exchange one ordinary share in our company, with a cash payment of 3s., for every two ordinary shares of the Electro Bleach, and one ordinary share in our company and a cash payment of 8s. for every two preference shares of the Electro Bleach. Holders of 97.5 per cent. of the shares of the Electro Bleach Co. have agreed to the proposal, and the necessary transfers have been completed.

In consequence of these transactions the issued capital of our company has, since the date of the report, been increased by £1,497,241, making our total issued capital to-day of £10,967,621. I have been told by my Labour friends that we are swallowing these concerns with the idea of making abnormal profits out of them. If industrial amalgamations are carried out to that end they are bad. If they are made to increase efficiency they are good. Our practice has been one of high production and low prices, and we intend to carry out that policy in these amalgamations to the best of our ability. The balance available for distribution is £1,265,465, and the directors ask you to increase the dividend from the 10 per cent. of last year to 11½ per cent. for this year. The amount proposed to be paid as ordinary dividend is increased by £198,471, due partly to the higher rate, and partly to the dividend to be paid to the former shareholders of the Buxton Lime Firms, Castner-Kellner's and Electro Bleach. We propose to place £50,000 to suspense account, and to carry forward the balance of £126,241.

Amicable Relations with Employees

The total number of men in our employ who joined his Majesty's Forces during the war is 2,688, and of this number 291 fell. We are erecting to their memory suitable memorials at all our works and at all our outside offices. To those who returned, we have given welcome in the shape of suppers and smoking concerts. The men were greatly interested to hear from us the great work the company did in their support in the manufacture of high explosives, and they were also gratified to find that we had not endeavoured to obtain from the State undue profits on such manufacture. We have commemorated long service in our employ by giving—again at smoking concerts—silver watches to those men with 25 years' service and gold watches to those with 35 years' service. At these functions 188 gold watches and 998 silver watches were presented. We had to name a date at which to fix the length of service, and

we took Dec. 31, 1919. At that time we had more men in our employ than at any time in our history. Of the men then in our service (who numbered 6,929), no fewer than 1,186 were of 25 years' service and over, and two had reached the maximum possible service of 46 years. The percentage of men of over 25 years' service at our two oldest works was 22.2 and 21.66 respectively.

I think you will agree that that is a record of which the company and its men have every reason to be proud. Of your directors, Sir John Jarmay and Mr. Poole, each with 41 years' service, Mr. Watts with 38, and Mr. Glendinning with 35, were given gold watches; Mr. Tangye with 34, Sir John Brunner with 32 and Mr. Harper with 30, were given silver watches. Mr. Robert Mond and I have to serve a few years longer before qualifying for silver watches, and the rest are comparative youngsters. It is a matter of regret when any business grows so large that the heads cannot know everyone in it, and our senior directors look back with regret to the time, now passed, when they knew every man by name, and most men by their Christian names. The watch presentations are to be annual functions, and we are sure they will do good to all who take part in them.

Synthetic Ammonia & Nitrates, Ltd.

With respect to the registration by us of a new company called Synthetic Ammonia & Nitrates, Ltd., with a capital of £5,000,000, that company has bought a site from the Ministry of Munitions at Billingham, opposite Middlesbrough, where during the war the Government began to put up a plant for the fixation of nitrogen from the air. It is a generally held opinion that if it had not been for the success of the Haber process in Germany, Germany could not have carried on the war as long as she did. We in England were not forced to fixation of nitrogen during the war, for the reason that this company was able to supply nitrate of ammonia made in other ways. The success of Synthetic Ammonia & Nitrates, Ltd., will, I suggest, have two results: First, it will secure our position both in another war and against another war, and, secondly, in peace time it will mean a greater production of nitrogen fertilisers. This will mean that we can produce in our own country more food, so that we shall be more secure both in peace and in war.

Conditions of Trade and Labour

Turning to the future prospects of trade generally, I suggest they would be bright if manufacturers generally could be assured of two things: First, full supplies of fuel and other raw materials; secondly, cessation of the vicious cycle of increase of wages and increases in prices. On the first point, supplies of fuel, as everyone knows, are short. Everyone knows also that though there are more men in the pits now than there were before the war, there is, nevertheless, a smaller output in the total and a smaller output per man. There is perhaps a reason why output should be smaller per man—viz., the development which ceased during the war, but which is now proceeding. When that development is finished we may perhaps look forward to a higher output; but the fact remains that at the moment there is a smaller output of fuel, whereas the trade of the country needs a very large increase, both for home consumption and for export.

On the second point, there is constant competition between men in every industry to secure at least as much as, or more than, their fellows in other industries, and this leads to chaos. Advances in wages lead to advances in prices, so that every advance in wages tends to become illusory. For example, the Chemical Employers' Federation, of which we are members, has lately received what is nowadays called "A Demand" from the trades unions representing the men in the chemical trade for an advance in wages of £1 a week. The advances we have already given are, for the lowest-paid day-men, 216 16 per cent. over pre-war, and for the lowest-paid shift-men 225 per cent. The present demand comes on the top of these, and does not mean a bare 20s. a week, because we have to add the famous 12½ per cent. and further allowances to shift-men. If we agreed to this demand, and did not raise prices, our ordinary dividend would fall to 4½ per cent. There is a limit to the power of any seller to raise prices. Abroad we are limited by foreign competition, and both at home and abroad we are limited by the knowledge that a rise in the price of a ton of soda ash means a rise in the price of a ton of a great many other commodities into which soda ash enters, so that, bearing

in mind the effect upon other trades, there is a limit to the amount by which we can put up our price. If our dividend went down to $4\frac{1}{2}$ per cent. our shares would be below par, and we could not raise more capital; we could not progress, the prosperity of the company would be gone, and the prosperity of the workmen would be gone also. In my opinion the time has come for all employers to say "No" to advances in wages.

Mr. Robert Mond, in seconding the resolution, paid an eloquent tribute to the late Sir John T. Brunner, who, with the speaker's father, the late Dr. Mond, founded the company.

As a tribute to Sir John Brunner's memory the audience rose in respectful silence.

The resolution adopting the report and accounts was unanimously carried, after Mr. D. Coghill had made an appeal for the distribution amongst the shareholders of some of the profits received from the sale to Messrs. Lever Brothers. As to this, the chairman explained that it was a capital profit which the directors were not prepared to dissipate.

The retiring directors were reappointed, together with the last-appointed director, Mr. Gerald W. Balfour.

£100,000 Grant to Universities Withdrawn

Sir John Brunner moved, and Mr. Robert Mond seconded, a resolution authorising the directors to distribute £100,000 to such universities or other institutions in the United Kingdom as they might select for the furtherance of scientific education and research.

The resolution met with considerable opposition, and on a show of hands the voting was so even that the chairman announced the withdrawal of the resolution. At the same time he described it as "a desperately mean thing for a big company to do."

The necessary formal resolution regarding the shares of the Castner-Kellner Co. was unanimously carried.

Phosphates for the Empire

Second Reading of the Nauru Island Agreement Bill

IN the House of Commons on Wednesday there was a vigorous debate on the Nauru Island Agreement Bill, which was ultimately read a second time.

The Island of Nauru is said to possess huge deposits of guano, and the debate turned on the question of securing this valuable supply for the Empire. Before the war the Germans governed the Island and a British company farmed the guano. Since the war the Supreme Council has awarded a mandate for the Island to the British Empire, and a syndicate of the British Empire, consisting of Australia, New Zealand and Great Britain, has bought out the guano company. The terms of the agreement are that the members of the syndicate shall have first claim on the guano at cost price in the proportion of their contribution to the buying out of the company (Great Britain and Australia 42 per cent. each, New Zealand 16 per cent.).

Colonel Wilson (Parliamentary Secretary to the Ministry of Shipping), in moving the second reading, said the Island of Nauru was about eight miles square and contained valuable deposits of phosphates. During the war it was pointed out how dependent the Empire was on foreign supplies of phosphates, and the supply of phosphates for fertilisers was most important. As a result of the discussions in Paris the solution of the problem which commended itself most was that the administration of Nauru should be conducted under the joint control of the three Governments of the Empire most directly interested, and that the Pacific Phosphate Company should be bought out and the minerals worked on a non-profit-making basis. The whole requirements of the three Governments were to be met at cost prices, which prices would include sinking fund and interest for the repayment of the capital debt. The surplus phosphates were to be sold elsewhere at commercial rates. Nauru had the largest reserves of high-grade phosphates in the world. The total amount of phosphates was estimated at 216,000,000 tons. The lowest estimate of the quantity visible at the present time was at least from 80,000,000 to 100,000,000 tons. The agreement also included the rights of the Pacific Phosphate Company in Ocean Island, in which it was calculated there were 15,000,000 tons of phosphate. After considerable negotiation, the purchase money was fixed at £3,500,000. He was convinced there would be no difficulty in maintaining an annual output of

from 400,000 tons to 500,000 tons. Australia and New Zealand would be able to obtain phosphates at £1 per ton cheaper, and though phosphates could not be conveyed to this country at the same low rates, owing to its distance from Nauru, the cost would be far less than at present. He was authorised to say that Mr. Watt, while still Treasurer of the Commonwealth of Australia, went into the question of the purchase money very carefully, and satisfied himself that £3,500,000 was a reasonable price. The sum would be repayable with interest out of the proceeds of the sale of phosphates by a Board of Commissioners. The paid-up capital of the Pacific Phosphate Company was £1,200,000. The title to the phosphate deposits was to be vested in a board of three Commissioners, one appointed by each of the Governments concerned. Any interest of the Pacific Phosphate Company in the deposits would be converted into a claim for compensation at a fair valuation. It was provided that phosphates should be supplied to the United Kingdom, Australia, and New Zealand at cost price, and to any other countries at the market price. He was convinced there was never a sounder investment for this country and the Empire, not only from the financial point of view, but from the point of view of securing for all time an important raw material.

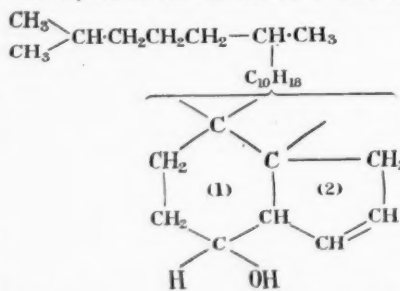
The agreement was criticised by several members on the ground that it established a British monopoly against other nations and contravened the spirit of the Peace Treaty and the League of Nations. Mr. Asquith pointed out that the British Empire did not consist of Great Britain, Australia and New Zealand. The Commissioners who were to carry out the mandate and who were to represent these three constituent, but not exhaustive, members of the Empire, "shall not sell or supply any phosphates to or for shipment to any country or place other than the United Kingdom, Australia, or New Zealand." This was the latest form of preference. When they came to hand over the phosphates, they were to go to the three selected parts of the Empire and not to the rest. South Africa and Canada were as much entitled as any other part of the Empire to have a voice in the matter. But what he thought far more important, in the execution of this supposed mandate, which could only legitimately proceed from the League of Nations, representing the world at large, they were going to give preferential treatment to particular parts of our own Empire as against the rest of the world.

Mr. Bonar Law said the speeches in condemnation of this agreement had assumed that we were doing something to the detriment of other nations. But what those who took that view forgot was that this Island in effect was a phosphate island; there were only some 1,000 or 1,500 inhabitants of any kind. It had been throughout a commercial undertaking, it was in the possession of a company originally German, which was bought up by a British company, and if the House did not pass this Bill the company would have every one of the rights which the Government were now claiming for the British Empire. It could treat the product of the island in any way it liked, and therefore it was obvious that, so far as the general good of the world was concerned, nothing was lost by transferring this power to a body represented by the British Empire as compared with a private trading company.

Sir W. J. Pope is at present in Rome attending the International Chemical Council.

At the end of this month the trustees of the RAMSAY MEMORIAL FUND will elect not more than three fellows. The fellowships, which are for the advancement of chemical research, are of the value of £300 a year each, and tenable for two years.

It has been decided to form a research association for the ironfounding industry, which is greatly in need of scientific research and development. This step has been taken by the Institution of British Foundrymen, and the Association will be under the auspices of the Government Department of Scientific and Industrial Research. It will have direct application to the gray and malleable cast-iron trades. It is proposed to have the offices and laboratories (existing) and bureau of information in Birmingham, and Mr. T. Vickers, Birmingham (the secretary of the Metallurgical Society), has been appointed technical adviser. Labour is giving its support to the scheme. There are 2,800 foundries in the country, 285 being in Scotland and 50 in Ireland.



The Faraday Society

Papers Before the Ordinary Scientific Meeting

WE give below summaries of the papers which were read at the Ordinary Scientific Meeting of the Faraday Society, held at the Chemical Society, Burlington House, Piccadilly, on Tuesday:—

In a paper on "The Measurement of Electrical Conductivity in Metals and Alloys at High Temperature," Mr. J. W. Haughton, of the National Physical Laboratory, described, with the aid of diagrams, an apparatus which he had designed, and which had been used successfully in the Metallurgy Department of the National Physical Laboratory during the past year, by which determinations and the electrical conductivity of metals and alloys up to 1,000°C. can be readily and accurately carried out.

Mr. A. M. Williams, of the chemistry department of the University of Edinburgh, in a paper on "The Pressure Variation of the Equilibrium Constant in Dilute Solution" showed that the apparent discrepancy between the values of the expression for the variation with pressure of the equilibrium constant in dilute solution as obtained by Planck and by Rice respectively rested solely upon a misinterpretation of the meaning of the symbols employed by the latter. On interpreting these correctly, the apparent discrepancy vanishes. Another proof of the theorem was presented, making the usual assumption that $pV = RT$.

A note describing models illustrating crystalline form and symmetry was contributed by Miss N. Hosali. The set of twenty-four models showed, in their natural positions, over 70 different forms, but when all the modifications produced by rotating or reflecting the models were taken account of, the number of forms was brought up to about 140.

Electrolysis of Sodium Nitrate

Experiments on the electrolysis of solutions of sodium nitrate using a copper anode were explained by Mr. F. H. Jeffery, who is of opinion that the reactions at the anode may be described as follows: (1) The formation of the cupric anion $\text{Cu}(\text{NO}_2)_2$ from the NO_2 ions and the copper. (2) The decomposition of this $\text{Cu}(\text{NO}_2)_2$ by the water present giving the basic nitrate $\text{Cu}(\text{NO}_2)_2 \cdot \text{CuO}$ and nitrous acid. (3) The slow decomposition of the undissociated portion of the nitrous acid formed giving nitric acid and nitric oxide. (4) Although the presence of nitric acid in contact with the copper anode must give rise to cupric ions if no current were passing, yet for the current of 0.16 amperes the concentration of such cupric ions as were formed was never sufficient for the deposition of copper on the cathode during electrolyses lasting many hours; the copper reacted with the NO_2 ions to form the complex, the anode potential remaining thereby at a low value, rather than with the NO_2 ions, which would have had the effect of raising the anode potential.

The result described in (4) is analogous to what happened during electrolysis with a silver anode in a solution containing NO_2 and NO_3 ions. Experiments with other metals and the same anolyte are in progress.

Sorption of Iodine by Carbon

"Sorption of Iodine by Carbon" was the subject of a paper by Mr. J. B. Firth, of the chemical department, University College, Nottingham. As the result of investigations in which the solute throughout was iodine, the solvents benzene and chloroform, and the sorption agents lampblack, sugar carbon, blood charcoal, animal charcoal, coconut charcoal from the fruit, and coconut charcoal from the shell, it was found that (1) The sorption of iodine by carbon consisted of a rapid surface condensation (adsorption), followed by a slow diffusion into the interior (absorption). (2) Adsorption was nearly instantaneous, and was complete in a few hours, whereas absorption might continue for several years. (3) The rate of sorption was dependent on the nature of the solvent, and the sorbing solid. (4) In the case of blood charcoal the adsorption was very high, whereas in the case of coconut charcoal absorption was the principal factor. (5) The concentration of the iodine in the liquid solvent diminished until a certain minimum was reached, after which the rate of change of concentration with increase mass of sorbing solid was so slow that the concentration appeared constant. (6) The smaller the carbon particles, the greater the initial adsorption, and (7) The presence of moisture in the carbon reduced its activity.

Formation of Electro-Chemical Chlorate and Perchlorate

The theory of electro-chemical chlorate and perchlorate formation was discussed in a paper by Messrs. N. V. S. Knibbs and H. Palfreeman. The paper, which was the outcome of a study of the electrolytic formation of chlorate and per-chlorate based on large scale operations, was divided into three parts. Part I. contained an account of some of the experimental work. It gave the results of the measurement of the conductivities of chlorate, chloride-chlorate, perchlorate, and chlorate-perchlorate solutions, the velocity constants of the reaction; hypochlorite to chlorate, and the resistance and potential effects in technical cells. The data on conductivities and on the dynamics of the hypochlorite-chlorate reaction covered, it is believed, a wider range than any previously published.

In Part II. the generally accepted theory of chlorate formation was set out. The sources of loss of efficiency were discussed, and the conclusion arrived at was that normally it was due mainly to hypochlorite ion discharge. An equation was developed to express the efficiency in terms of temperature and the other controlling factors. It took the form:—

$$I = n = \frac{k F (T)}{k^{\frac{1}{2}} h^{\frac{1}{2}} v [\text{HOCl}]^{\frac{1}{2}} f(T) + k F (T)}$$

Experiments to obtain the constants of the equation were described, and with these substituted it became

$$I = n = \frac{311 [1 + 0.014 (T - 80)]}{450v [\text{HOCl}]^{\frac{1}{2}} e^{0.60 + 0.056 T} + 311 [1 + 0.014 (T - 80)]}$$

for temperatures above 60°.

The energy efficiency of the chlorate cell was also discussed and brief reference was made to the methods of maintaining hypochlorous acid concentration, and to the effect of insoluble impurity in a cell.

Oechsli's theory of perchlorate formation was given in Part III., together with the phenomena which it was held to explain. It postulates discharge of chlorate ions at the anode, followed by certain chemical reactions. Bennett and Mack's objections were referred to, and their own theory enunciated. This theory rejects chlorate ion discharge, and postulates direct oxidation of chlorate by anodic active oxygen. Both theories were discussed, and the conclusion arrived at that neither was adequate. It was maintained that perchlorate formation was due to chlorate ion discharge, but that the reactions taking place subsequently were not those proposed by Oechsli. A mechanism similar to that of persulphate formation was suggested. The factors in the current efficiency of technical perchlorate formation were then discussed, and in this connection chloride formation was shown to take place during electrolysis and to be dependent upon the temperature. The energy used in a perchlorate cell was also discussed.

Conduction of Electricity through Fused Sodium Hydrate

In a paper by Messrs. A. Fleck and T. Wallace experimental work on the conduction of electricity through fused sodium hydrate was described, the result of which may be summarised as follows:—(1) It was shown that if a constant current were passed between two electrodes placed closely together immersed in a mass of fused caustic soda, and the two electrodes were moved apart, then the resistance increased until a certain maximum value was reached, after which it remained constant. (2) The conduction of electricity across fused caustic by electrodes of different sizes was studied, and an approximate idea was obtained of the laws which governed the rate of change of resistance compared with the size of the electrodes. (3) The rate of change of resistance between 320°C. and 480°C. for fused caustic was found to be 0.102 per cent. fall per °C. rise in temperature. (4) The decomposition voltage was found to be a variable quantity, decreasing at the rate of 2.25×10^{-3} per °C. rise in temperature. (This figure was considerably different from Neumann's figure of 2.95×10^{-3} .) (5) A current had been passed through fused caustic soda between two sodium electrodes. It was found that Ohm's Law was obeyed, so that we had here a confirmatory experiment that in fused caustic ions were already in existence, and that no energy was required to disrupt the molecule of sodium hydrate.

Mr. H. F. Haworth contributed a paper on "The Measurement of Electrolytic Resistance using Alternating Currents."

Colloidal Clay in Soap Manufacture

To the Editor of THE CHEMICAL AGE

SIR.—In your issue of April 17 Messrs. W. Feldenheimer and F. E. Weston, of Catalpo, Ltd., made some remarks which force me to ask once more the hospitality of your journal in order to put things straight and avoid misunderstandings. To support their arguments they found it necessary to speak with some contempt of this south-eastern part of Europe. I must remind them that although it is a fact that in the north-eastern part of Europe Thomas Graham in 1861 laid the foundation of the experimental study of this branch of chemical science, it is also true that in 1900 to 1903 from the south-eastern part a very marked impulse towards its recent development had been given, and in 1906 a summary of its laws had been attempted.

With regard to Mr. Weston's remarks I could not know whether his knowledge on the detergent properties of clay was previous or subsequent to his experiments. This cannot be inferred from his writings, not even from his citations. Thus the impression I expressed in my letter remains unchanged, and is strengthened by the recent remarks he made in support of the term adsorption and the authorities to which he appeals to clear up his position. It is apparent that here the result is confounded with its cause. When we put coal powder, clay, or jelly in a solution a certain amount of the unsolved substance goes on these added bodies, the concentration of the solution becomes smaller, the dissolved substance getting divided between the free solvent and the phase containing the wetted coal-powder, clay, jelly, &c., viz., the absorbent body. It is clear that the dissolved substance diffuses into the absorbent body which is saturated by the solvent. The concentrations of the dissolved body in the two phases in contact with each other are bound by the so-called *equilibrium equation*.

From Henry's law on absorption of inert and permanent gases it has been thought advisable to consider as true absorption the cases showing in the equilibrium equation a simple proportionality of the concentrations of the dissolved substance in the two phases, and as not true absorption no cases where this simple proportionality does not exist. Dubois Reymond in Berlin called these last cases *adsorptions* in contradistinction to the true absorptions. Thus adsorption has been called a case of not normal absorption. This difference has been attributed to the attraction of the great surface of the porous and powdery bodies, and thus the word adsorption was used to notify the phenomenon and at the same time its cause. Afterwards the thermo-dynamical studies of Gibbs gave to this view a theoretical support by introducing the image of the dissolved substance concentrating itself on the surface. Then we learn adsorption is used to describe this change in concentration. Others recognising that the process is not instantaneous, but that a slow diffusion continues, recognise that the process is not a true adsorption and call it *sorption*.

The appeal to the authority of Willard Gibbs is very unfortunate, as Gibbs never wrote: "that at the surfaces of a dispersed system a different concentration was to be expected from that which prevails in the body of the dispersoid," as he wrote in 1878, and the terms "dispersed medium" and "dispersoid" appeared in 1907. Also Gibbs took great pains accurately to define his terms and make quite clear what he meant when using them. Is this the case with the terms "dispersed system" and "dispersoid"? If I rightly understand, "dispersed system" ought to mean here a liquid medium containing a substance in a finely divided or a dispersed state. The same meaning ought to be given also to the term "dispersoid," which would then be synonymous with "dispersed system." But by "dispersoid," as far as I know, we mean a substance capable of forming dispersions in contradistinction to the emulsoids which form emulsions—dispersoids and emulsoids—two kinds of colloid substances.

The confusion becomes greater by the use also of the term surface. Gibbs has defined very accurately his dividing surface and given precisely the conditions and limitations of the validity of his conclusions. The surface of colloid absorbing media is not a reality, but an item of calculation, and other conditions prevail different from those assumed by Gibbs in his dividing surface. This alleged lack of uniformity of concentration in a solution, getting charcoal, clay, porous bodies, jellies, &c., is not yet an accepted fact, but an explanation of the experi-

mental equilibrium equation of distribution as explained. But there exist many cases of distribution between jellies and solutions where the single equilibrium equation on Henry's law holds good, and a perfect uniformity of concentration ought to be inferred, nevertheless these cases are called also adsorptions.

I think I have made it clear that the term adsorption and other terms used now in colloid chemistry are corruptions and give rise to obscure propositions which cannot be beneficial to the progress of science.—Yours, &c.,

Athens, Greece,
May 6, 1920.

DR. P. D. ZACHARIAS,
Chemical Engineer.

Dr. Haworth's New Appointment

At a meeting of the Council of Armstrong College, Newcastle, on Monday, Dr. W. N. Haworth was appointed Professor of Organic Chemistry. Dr. Haworth was trained at the University of Manchester and graduated in 1906 with first-class honours in chemistry. He became private assistant to Professor W. H. Perkin, now of Oxford, and afterwards studied in the University of Göttingen, Germany. He was demonstrator in chemistry at the Imperial College of Science, London, and he afterwards became Reader in Chemistry in the University of St. Andrews, where he has been for the last eight years. Dr. Haworth has published the results of various researches on terpenes and the sugars. In securing the appointment of Professor of Organic Chemistry at Armstrong College, he succeeds Dr. Samuel Smiles, who was recently appointed Professor of Organic Chemistry at King's College, London. Dr. Haworth was present at the Council meeting, and was cordially welcomed.

A new scale of salaries for all the junior staffs was agreed upon, and it was placed on record that in view of the serious financial position of the College, the Professors had agreed to waive their claims to higher salaries for the time being, in order that the lesser paid members of the staff should receive first treatment.

Pulverised Coal and Alloys

MR. A. J. G. SMOUT addressed the members of the Birmingham Metallurgical Society at a recent meeting—the last of the session—on the subject of "Modern Metal Melting." He made special reference to the use of pulverised coal in the melting of non-ferrous alloys, a question which has lately engaged the close attention of chemical engineers. Mr. Smout pointed out that in America the vast copper smelting industry was taking up the new fuel with avidity. The Fuel Research Board were putting down an experimental plant of no mean size, so that in the near future our knowledge of the subject should be considerably increased. In any but the largest sized works the cost of putting down a complete powdered coal plant would be prohibitive, and it was assumed that in order to make it possible for users to obtain the fuel at an economical price, central supply stations would be erected in large industrial areas. The multi-crucible type of furnace was useful for melting in small bulk, and the thermal efficiency on powdered coal was about 16 per cent. The use of powdered coal for brass melting had not yet been seriously attempted even in America, but a plant had recently been treated in Italy, and the results would be watched with the keenest interest.

Books Received

- EVERYDAY CHEMISTRY. By W. Robinson. Methuen & Co., Ltd., London. Pp. 131. 3s. 6d. net.
- CHEMICAL SERVICES' COMMITTEE, 1920 REPORT. Government Central Press, Simla. Pp. 121.
- FOOD INSPECTION AND ANALYSIS. By Albert E. Leach. Revised by Andrew L. Winton. Fourth Edition. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. Pp. 1,090. 45s. net.
- NOTES ON CHEMICAL RESEARCH. By W. P. Dreaper. Second Edition. J. & A. Churchill, London. Pp. 195. 7s. 6d. net.
- THE CHEMISTS' YEAR BOOK, 1920. Edited by F. W. Atack. Sherratt, and Hughes, Manchester. Vol. I., pp. 422; Vol. II., pp. 1136.

Hull Chemical and Engineering Society Visit to Fenner & Co.'s Belting Works

The members of the Hull Chemical and Engineering Society paid a visit on Saturday, June 5, to the works of J. H. Fenner & Co., belting manufacturers, Marfleet, Hull.

After passing through the new and capacious offices the members were shown the hides and skins in their raw state. The various processes of cleaning, tawing and tanning were clearly explained by Major J. Fenner. The roughly tanned hides were next shown being scoured by stones to remove all the surplus tan and sediment; greasing was the next process. This removed all sense of hardness, making the fibres soft and pliable. The hides were then cut into "butts," and hung up to dry. From thence they went to the belt department proper, where one machine brushed off the grease, another polished the surface, and a third cut it into strips of suitable width. These strips were spliced and cemented together so as to form one long belt, the joints being further strengthened by sewing with laces by hand, or with copper wire by machine. After sewing, the belt was placed on an ingenious machine which removed the stretch and tested the belt under actual running conditions. The final processes of coiling, measuring, smoothing, and polishing the edges were all carried out by machinery.

Manufacture of Textile Belting

Another interesting department was that for the manufacture of textile belting. A loom was shown at work weaving a 21 in. wide belt, and the members were shown how the belts were coiled, stretched, examined, impregnated, and painted. After maturing, these belts were also examined for "stretch."

In another department diamond-pointed carding was being made for use in wool, cotton, and flax spinning mills. Marvellous machines cut lengths of wire from a coil, formed them into staples, bent them, formed teeth on the ends and then pressed them through a leather belt foundation. In use these belts are wound spirally round cylinders to card fibres and allow them to be drawn off and twisted into yarns.

The increasing trade of these works has made necessary the erection of further buildings which are now in the process of erection.

Tea in the large office and a cordial vote of thanks by the President and members concluded a most instructive visit.

Progress in Thermo-Electricity

THE May lecture on "Recent Progress in Thermo-Electricity" was delivered by Professor C. A. F. Benedicks, Ph.D., of Stockholm University, before the Institute of Metals, on Thursday, June 10, Engineer Vice-Admiral Sir George Goodwin, president, in the chair.

Professor Benedicks first gave a short summary of his views upon the metallic condition of electricity which explained many matters not made clear by the former electron theory. A consequence of this new theory was that one had to conclude that even in a single homogeneous metal thermo-electric currents occur; hitherto such currents were believed to be produced only when two different metals were present. Professor Benedicks gave a concise demonstration of the most important experimental evidence of the truth of this conclusion, utilising for this purpose various metals. In liquid mercury it had been possible for him definitely to prove the existence of thermo-electric currents, thus disproving the negative results of previous workers. A consequence of what the lecturer termed his "homogeneous thermo-electric effect" was that there must exist the reverse effect, the "homogeneous electro-thermic effect," including as a special case the well-known Thomson effect. The reality of this effect was duly made clear. A specially interesting demonstration was of a new rotating thermo-electric apparatus made entirely of copper and rotating in a magnetic field, the driving force originating solely from unequal heating (by means of a tiny gas jet) of thin strips of copper.

The point at which the new knowledge brought forward by Professor Benedicks might have some practical interest lay in the possibility of reducing the thermal conductivity of metals by insulated sub-division into fine wires without impairing the electrical conductivity. The demonstrations were carried out with the aid of a galvanometer provided by the Cambridge & Paul Instrument Co.

Chemical Matters in Parliament

Sulphate of Ammonia

Mr. Houston asked the President of the Board of Trade (House of Commons, June 14) (1) whether, in view of the great importance of our export trade, he could remove all restrictions on the export of sulphate of ammonia; if he were aware (2) that the works on the banks of the Manchester Ship Canal belonging to the Salt Union, Ltd., which were specially constructed for the manufacture and export of sulphate of ammonia, had had to be closed down on account of the restrictions of export; (3) that ample supplies of sulphate of ammonia could be provided to meet all the demands for fertilisers in this country without interference with the export trade; (4) that it was owing to the unfounded fears of the Board of Agriculture that export had been prohibited and manufacturers of sulphate of ammonia forced to join a ring or association of manufacturers of this article to supply the home market, thereby causing works which produced for the export trade to be closed down.

Sir R. Horne: The restrictions on the export of sulphate of ammonia were imposed at the instance of the Board of Agriculture, and are administered by the Board of Trade on the advice of that Department which is responsible for the maintenance of the supply of fertilisers for agriculture in this country in adequate quantities and at reasonable prices. In view of this and of the introduction in this House of the Fertilisers (Temporary Control of Export) Bill, which has already been passed in another place, I would suggest that any inquiries and representations should be addressed to the Parliamentary Secretary for the Board of Agriculture.

Shortage of Fertilisers

Sir A. Boscawen in reply to Mr. Carew (House of Commons, June 14) stated that he was aware that there was a shortage of basic slag primarily due to the greatly increased demands. He was, however, informed that supplies for the coming season were expected to be substantially greater than during last season. The Minister of Agriculture was taking every possible step to augment supplies, and had recently appointed a Committee to consider the improved methods of manufacture and use of basic slag. With regard to other fertilisers, he saw no reason to expect a shortage during the coming season, except in the case of potash, provided that powers to control export were continued, for which purpose a Bill was now before Parliament. As regards potash, supplies of which depended largely on labour, fuel, and transport conditions on the Continent, there was a world shortage of this fertiliser at the present time.

Merchandise Marks Act

In reply to questions by Mr. Bowerman (House of Commons, June 14), Sir Robert Horne said that the Report of the Committee on the Merchandise Marks Act had been received, and steps were being taken to publish it shortly. He was unable to make any statement as to the intentions of the Government until the report had been fully considered.

Export of Basic Slag

It has been brought to the notice of the Ministry of Agriculture that in some quarters the shortage of basic slag is being attributed to the permission of export on a large scale. There is, the Ministry asserts, no foundation in fact for these reports. Export is prohibited except under licence, and the Board of Trade "Trade and Navigation Accounts" show that in 1919 only 13,699 tons were exported, which amounts to 2½ per cent. of the total quantity ground in that year. Similarly, for the first three months of 1920, the exports only amounted to 1,489 tons, about 1 per cent. of the total production. These percentages are much less than the proportion which manufacturers were entitled to ask for in return for their acceptance of the maximum delivered prices for basic slag in Great Britain. In the interests of agriculture they have, however, decided not to insist upon exporting the whole of the quantity which would have been licensed, with the result that the actual exports cannot be said to have accentuated the shortage of slag in any appreciable degree. Labour and transport trouble, and such accidents as the destruction by fire of a steel works, must be looked to for an explanation of the difficulties in obtaining slag, but these are now decreasing and there are good prospects of increased supplies for the 1920-1921 season.

From Week to Week

The death is announced of Mr. J. C. GALLETTY, of 14, Geogr Road, Erdington, Birmingham, rubber chemist.

The death took place recently of COLONEL A. SIMONIUS chairman of the board of directors of the Clayton Aniline Co., Ltd.

The DANGEROUS DRUGS BILL was read a second time in the House of Commons on Thursday, June 10, and committed to a Standing Committee.

The offices of the Pan de Azucar Nitrate Co. and the Alianza Co., on and after June 25 will be at 145, Dashwood House, New Broad Street, E.C.2.

Oxford University have decreed that the laboratory of organic chemistry endowed by Mr. C. W. Dyson Perrins shall be called the DYSON PERRINS LABORATORY.

LORD COWDRAY has been presented with a portrait of his son (the Hon. B. C. Pearson) by the staffs of the oil companies of which he has for many years been the head.

Considerable damage was caused by a fire on Monday at DENT'S TAR WORKS, West Carnforth, Durham. A bed of pitch of large dimensions became ignited and railway trucks and tank wagons containing tar and oils were destroyed.

Mr. A. Macdonald has retired from the firm of J. F. MACFARLAN & Co., manufacturing chemists, Edinburgh and London. Mr. D. R. Brown will continue the business under the same firm name and will receive and pay all debts due.

Dr. R. S. MORRELL, recently chairman of the Birmingham and Midland Section of the Society of Chemical Industry, has been elected president of the Oil and Colour Chemists' Association, in succession to Dr. F. Mollwo Perkin.

The four new Professorships created by the Council of Sheffield University include glass technology, to which Dr. W. E. S. Turner has been appointed professor. Dr. Turner is at present lecturer in charge of the department of glass technology at the University, which he has practically created.

B. LAPORTE, LTD., OF LUTON AND BRADFORD, intimate that the large formic acid plant which has been in course of erection at their Bradford works for the last two years is now completed. The acid produced is of 80 per cent. strength, water white, and is considerably more economical to use than acetic acid at present market prices of the two acids.

The gift of £1,205,050 offered by THE ROCKEFELLER FOUNDATION to London University for medical training and research is to be divided between University College Hospital and Medical School and University College. Of the £835,250 allotted to the former, £50,000 will be spent on a new biochemical laboratory.

At a meeting of the council of LEEDS UNIVERSITY on Wednesday a resolution was passed accepting with gratitude the gift of £6,500 from the Clothworkers' Company in aid of the enlargement of the laboratory accommodation and the provision of additional equipment in the clothworkers' departments of the University.

The Pharmaceutical Society of Great Britain have appointed Mr. ERNEST PRESTON, of Barker's Pool, Sheffield, one of their examiners. Mr. Preston is one of the most prominent pharmacist in Sheffield, and is president of the Sheffield Pharmaceutical and Chemical Society. For some time he has been lecturer for the Sheffield Education Committee in Pharmacy and Materia Medica, and he is a member of the National Health Pharmaceutical Committee in Sheffield.

On the nomination of Mr. E. Whitley, Mr. BENJAMIN MOORE, M.A., D.Sc., Queen's University, Ireland, recently Professor of Bio-Chemistry at the University of Liverpool, and previously Professor of Physiology in Yale University, U.S.A., has been appointed first Professor of Bio-Chemistry in the University of Oxford. It will be remembered that Mr. Whitley recently gave £10,000 towards the endowment of the Professorship.

The chimney of one of the smaller buildings of DAY & MARTIN'S blacking factory at Stratford, E., was struck by lightning during the thunderstorm on Monday afternoon. The bricks crashed through the roof, but no one was injured, the building being a one-storey cottage used by the factory girls at meal times only. Had the accident occurred an hour or so earlier there might have been serious casualties, as from 50 to 60 girls have their dinner in the place.

The Albert Medal of the Royal Society of Arts for 1920 has been awarded to Mr. A. A. MICHELSON, Professor of Physics in the University of Chicago, whose optical inventions have rendered possible the reproduction of accurate metric standards, and have provided the means of carrying out measurements with a minute precision hitherto unobtainable. Professor Michelson's contributions to scientific research have been recognised by the award of the Copley Medal of the Royal Society and of the Nobel Prize for Physics, both in 1907.

Owing to the popularity of the degree courses at the MANCHESTER COLLEGE OF TECHNOLOGY large numbers of applications have been received from students all over Lancashire, and it has become necessary to limit the number entering for these courses in the interests of the young Manchester students not intending to take a degree. The Education Committee, on Monday, decided, therefore, to recommend the City Council not to admit more than 80 new degree students at the Michaelmas term. There will be room, it is stated, for 240.

The application of the AMALGAMATED SOCIETY OF PHARMACISTS, DRUG AND CHEMICAL WORKERS for the revision of the present scale of wages and a re-classification of all grades of workers was discussed at a conference with representatives of the Drug and Fine Chemical Manufacturers' Association in London last week, when it was agreed that a sub-committee representative of both sides should at once be set up for the purpose of carrying out the re-grading, and on the question of wages the proposals which were made by each side are to be put before the members of the union.

At the annual meeting on Monday of the London Section of the SOCIETY OF CHEMICAL INDUSTRY, Mr. Julian Baker was re-elected chairman for the ensuing year, and Dr. Monier-Williams was elected honorary secretary in the place of Dr. Stephen Miall, who has resigned. Professor W. R. E. Hodgkinson, Mr. A. Chaston Chapman, Dr. Bernard Dyer, Mr. Alexander H. Dewar, and Mr. James Connah were elected to the committee in the place of Mr. A. E. Berry, Professor J. F. S. Brame, Mr. H. Edwin Coley, Mr. Charles S. Garland and Professor A. R. Ling.

Analysis of sea-weed found in the Thames estuary has been carried out in the laboratory of the THAMES PAPER CO., LTD., with a view to the utilisation of the weed for paper making, but the chemist's report shows that the fibre content is practically nil, the water content being 73.50 per cent., and the dry bone weight 26.50 per cent. The latter was chiefly dirt and foreign matter, salt (sodium chloride and other halogens), and colloidal substances akin to gelatine. The amount of fibre was practically negligible and was extremely difficult to isolate on account of the "colloids." Cellulose was not worth estimation, and the sample was useless as a raw material for paper-making.

SIR JOHN CADMAN has resigned his position of the chair of mining at the University of Birmingham, and the authorities are inviting applications for a successor at £1,250 a year; also an assistant professorship in petroleum technology. Sir John, who has been appointed adviser to the Government on questions affecting coal and petroleum, is a native of Newcastle (Staffs), has, during the period following the armistice, been frequently called into consultation by the Government on oil matters, of which he is an authority. He has been a member of a Royal Commission reporting on the oil fields of Persia, director of the Petroleum Executive, and chairman of the Inter-Allied Petroleum Conference.

At a meeting of the governors of the ROYAL TECHNICAL COLLEGE, GLASGOW, on Tuesday, the Committee on Chemistry and Metallurgy reported that the Iron and Steel Trades' Associations had agreed to give subscriptions, to be renewed in all probability annually, amounting together to £400. The Committee also reported upon an arrangement made with the shale oil companies regarding research work in the College. The chairman said that the Shale Oil Research Association had been formed by the Scottish companies in the industry with the object of carrying on research regarding shale and oil and the by-products of their manufactures. They had appointed the superintendent of the Chemical Department of the College as director of their research work and laboratory experiments. The work was to be done by him inside the College, and an arrangement had been made which would be of great value to the College and to the industry.

American Notes

Colonel M. T. Bogert

Colonel M. T. Bogert, of the Department of Chemistry, Columbia University, has been elected president of the American Section of the Société de Chimie Industrielle of France. Professor Bogert was president of the Society of Chemical Industry of England in 1913, and has been twice president of the American Chemical Society.

Nitrate Shipping Arrangements

The lack of tonnage to bring the Chilean nitrate to American ports has been causing the farmers grave anxiety, but an agreement has now been reached by the American Shipping Board and the principal Chilean nitrate concerns under which the Board has agreed to furnish prompt requisite tonnage covering a period up to July 1. After that date, according to the agreement, importers will submit their sales on the first of each succeeding month and the Shipping Board will enter into further engagements to supply the required tonnage.

Consolidation of Geological Survey and Bureau of Mines

A consolidation of the Geological Survey and the Bureau of Mines is proposed in a bill which has been introduced by Senator Henderson of Nevada, the ranking member of the Committee on Mines and Mining. The consolidated bureaux are to be known as the Division of Mines and Geology, and are to be administered directly by an assistant secretary of the Interior, who "shall be technically qualified by experience and education" for the position. The bill specifies that the assistant secretary in charge of the division is to receive a salary of \$10,000.

Research Work at New York University

An interesting test now being planned by the faculty experts at New York University is that of ventilating fans, used under the severe conditions of handling acid fumes from chemical laboratories. Several models are being set up in the University laboratories, and through many ingenious methods the corrosive effect on these fans in removing the vitiated air and determining the friction losses in the ducts will be observed. Under the direction of Professor Collins, P. Bliss, and Hazen G. Tyler, two members of the faculty, who are in close touch with American industries, arrangements are being made for further co-operation along these lines.

The Interstate Cottonseed Crushers' Association

At the annual convention of the Interstate Cottonseed Crushers' Association held at New Orleans last month it was decided to admit edible oil refiners and compound lard makers to membership. It was decided, however, not to change the name of the Association. A new constitution and by-laws will permit of the necessary expansion. There has been a waste of time, it is stated, in running the mills only during the cottonseed season, and a great economic loss in allowing the machinery to remain idle for the remainder of the year. It is proposed to use oil-bearing seeds from the Far East to fill in the idle period and thereby keep the mills running for the entire year.

National Fire Protection Association

At the annual meeting of the National Fire Protection Association held in Chicago in May the committee on hazardous chemicals and explosives presented a report covering regulations for the storage, handling, and use of pyroxylin plastics in factories making articles therefrom. The report covered these substances, whether used in the form of raw materials, stock in the process of manufacture, unfinished or finished products or scraps, and the use and storage of nitro-cellulose film.

The term pyroxylin plastics was held to mean and include any plastic substance, material or compound having soluble cotton or similar nitro-cellulose as a base, and thus included celluloid, fibreloid, pyralin, viscoloid and similar products, whether in the form of blocks, slabs, sheets, tubes or fabricated shapes, as well as lacquers, enamels, paints, thinners, cement, and dope.

Chemical Engineers' Summer Meeting

The summer meeting of the American Institute of Chemical Engineers will take place this month in Canada, and the date has been tentatively fixed for June 21-28. The programme includes a meeting of two days, on Monday and Tuesday, June 21 and 22, at Montreal for the business sessions, reading

of papers, and possibly one or two excursions to chemical industries in Montreal. Wednesday, the 23rd, will be spent at Ottawa, inspecting the Government buildings and laboratories of the Bureau of Mines, and visiting the copper and nickel refinery of the British-American Nickel Corporation at Deschene, Que. On Thursday, visits will be made to the plant of the Delora Refining and Reduction Co. at Delora, and of the Industrial Alcohol Co. at Corbyville. Friday, the 25th, will be spent at Shawinigan Falls, Que., where the visitors will have an opportunity of seeing the electro-chemical plants and power development there. On Saturday a trip to La Tuque, Que., will be made, where the large sulphate pulp mill of the Brown Co. will be visited. From this point a trip is being planned to the large artificial lake at La Loutre. This includes a 50-mile boat trip, stopping at a fishing camp on the lake, where there will be an opportunity for boating and fishing. After a stop of a day or two at this point the return trip will be made to Quebec. Arrangements have been made with the Canadian National Railway for a special train.

Lignite Carbonisation Research Plant

The United States Bureau of Mines has completed arrangements for a co-operative plan to carbonise lignite and develop the necessary information that it is hoped will "make possible a favourable technical and business report which shall stimulate duplication of such plants throughout lignite areas." To this end a co-operative agreement has been made between the Bureau of Mines and Messrs. J. B. Adams and F. Bremier, under which an appropriation of \$100,000 and an additional \$200,000 which is to be furnished by Messrs. Adams and Bremier will be used for the construction of the plant required, and as a working capital for its operation. The plant will be installed at New Salem, N.D.

The plant contemplated will consist of a battery of ovens of new form which have been designed by the engineers of the Bureau of Mines, under the direction of Mr. O. P. Hood, chief mechanical engineer. This battery will, it is estimated, coke at least 100 tons of raw lignite per day and provide for complete recovery of the liquid and gaseous byproducts as well as for the handling of the char, from which it is planned to produce briquets. The briquetting plant will also be of special design, and it is to be an integral part of the plant, so that the char will be handled direct from the battery to the briquetting machine hoppers.

Proposed Fertiliser Act

Mr. G. N. Haugen of Iowa, chairman of the House of Representatives Committee on Agriculture, has proposed a Bill entitled "United States Fertiliser Act" for fixing the standard, labelling, and marketing fertiliser. In it the Secretary of Agriculture is empowered to establish standards for grades of fertilisers by which the quality and condition may be determined, and the Department representatives have authority to inspect any factory or storehouse and to investigate any books or records of the fertiliser industry.

Invoices and container labels are to be marked with the:—
Name and address of manufacturer.

Net weight in pounds.

Per cent. by weight of available N_2 , P_2O_5 and K_2O .

Name of each ingredient, carrying available N_2 , P_2O_5 and K_2O , and the proportion of each such ingredient if more than one be included.

Percentage weight, and kind of each ingredient having fertiliser value other than ingredients containing available N_2 , P_2O_5 and K_2O .

Grade of fertiliser compared to U.S. standard.

Other facts to prevent frauds.

The general opinion on the measure is that the difficulty experienced by the Government in fixing standards on grain and enforcing other similar laws will be even greater in the fixing of standards on fertilisers. Although it is recognised that the uniformity of requirements and labelling would protect the consumer against fraud it is pointed out that the multiplicity of different brands (208 being listed in a single State report, all having the composition of 10 per cent. phosphoric acid, 2 per cent. ammonia, and 2 per cent. potash), and the fact that they are taxable, have led to a system of registration and inspection fees imposed on the industry by different States whereby the States derive a considerable revenue. In fact, many of the State colleges and agricultural schools which now are either entirely or partially supported from this income would be seriously crippled were this revenue cut off.

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German

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Miscellaneous

- OXALIC ACID.** The action of heat on oxalic acid and oxalates. G. Calcagni. *Gazz. Chim. Ital.*, April, 245-251.

A Liversedge Soap Contract

Appeal and Cross Appeal Dismissed

IN the Court of Appeal on Monday Lords Justice Bankes, Warrington, and Scrutton dismissed an appeal and a cross appeal, the former by David Hinchliffe & Sons, Ltd., Liversedge, and the latter by John Hay v. Richmond, the plaintiff in an action for damages against Messrs. Hinchliffe, arising out of the sale of 25 tons of soap to Mr. Hay. According to the case for the defendant appellants the plaintiff's representative in February, 1918, attended at their works and was shown some soap which the defendants were then manufacturing from whale oil, and agreed to buy 25 tons at £55 a ton. It was not a sale by sample, they said, but it was a term of the contract that three bars of the bulk should be supplied to be sent as samples to the plaintiff's customers. About 10½ tons were supplied, and the plaintiff's case was that when he resold the soap to his customers they said it was not the soap they wanted, that the soap which the defendants had sold to him might be described as household soap, and that that supplied was an inferior soap made from whale oil. Mr. Justice Roche gave judgment for the plaintiff for £250 instead of £411 claimed by him.

Lord Justice Bankes, with whom the other Lord Justices concurred, said it was impossible to interfere with the conclusion of fact which the learned judge had come to, which was that the sample which the defendants supplied was not the sample of the soap which they were manufacturing. As to the plaintiff's appeal on the amount of damages the learned judge thought that the plaintiff would command and obtain a higher price for the soap he sold to his customers by describing it as household soap than he would have done if he had merely passed it on as sale by sample, and he would not allow the plaintiff the whole amount that he had to pay his purchasers by way of damages.

The appeal and cross appeal were therefore dismissed.

German Debts

THE Controller of the Clearing Office (Enemy Debts) warns the public that attempts are being made by German agents or principals to obtain direct settlement or payment of their pre-war debts from their British debtors.

By the terms of the Treaty of Peace Order, 1919, it is unlawful for any person to pay or to accept payment of a debt coming within the provision of Article 296 of the Treaty of Versailles, and communication between the parties interested as debtor or creditor is forbidden. Any person contravening this provision is liable to be proceeded against and punished as if he had been guilty of the offence of trading with the enemy. Severe penalties are similarly imposed by German law on German nationals contravening this provision of the Treaty. Persons or firms to whom overtures have been, or may be, made for settlement of pre-war debts, except through the Clearing Office, are requested immediately to communicate full particulars to the Secretary of the Clearing Office (Enemy Debts), Cornwall House, Stamford Street, London, S.E.1.

British nationals who are creditors of German nationals in respect of pre-war debts, and who have not yet notified their claims to the Clearing Office, should do so at once, in view of the fact that the time limit fixed by the Treaty for notification expires on July 10, 1920. British nationals, to whom official applications have been sent by the Clearing Office for payment of all debts whether above or below £50 admitted to be due to German nationals, should pay these debts forthwith; failure to do so increases the interest chargeable against the debtor and exposes him to the risk of payments of law costs. British claims to the number of 34,802 were, on May 15, notified to the German Clearing Office, and a further large number will be notified during the present month. As soon as the notification of the admission of these claims has been received from the German Clearing Office payment will be made by the Controller without further request by the British creditor.

Mr. L. W. Jones

Mr. L. W. Jones, Dean of the College of engineering and architecture and Dean of the school of chemistry, at the University of Minnesota, has been appointed professor of organic chemistry at Princeton University, N.J.

Patent Literature

Abstracts of Complete Specifications

123,325-6. FORMIC, ACETIC AND BUTYRIC ACIDS, OBTAINING FROM SEAWEED OR WASTE VEGETABLE SUBSTANCES. Soc. Darrasse Freres, 13, Rue Pavée, Paris; and L. Dupont, 2, Villa David, Vincennes, Seine, France. International Convention date (France), February 13, 1918.

123,325. Seaweeds or marine algae are treated with bacterial cultures, such as those found on the algae, or by adding algae to bacterial cultures. Oxides, hydrates, or carbonates of the alkalies, alkaline earths, or metals of the zinc and iron groups are added to neutralise the mixture and the residue is acidified and distilled to obtain formic, acetic, and butyric acids. Iodine and potash may be recovered from the residue.

123,326. Formic, acetic, and butyric acids are obtained in a manner similar to the above by fermenting vegetable matter and waste products, such as alkaline or bisulphite lyes from the preparation of paper pulp, sawdust, tannin, corozo waste, &c.

136,145. CONCENTRATING ORES. M. Lesser, 155, Skinner Street, Pretoria, South Africa. International Convention date (South Africa), December 2, 1918.

An inclined endless belt is carried by a frame which is suspended above a tank, and the belt is driven by gearing which is carried by the same cross girders which support the belt frame. The belt frame is carried by flat springs and is reciprocated longitudinally by means of an eccentric. Ore is fed from a hopper on to the belt and the heavy material is carried upwards and deposited on one side of a vertical partition in the tank, while the lighter material is deposited on the other side.

142,874. HYDROGEN AND NITROGEN, MANUFACTURE OF MIXTURES OF. J. Harger, Grange Hollies, Gateacre, Liverpool. Application date, November 28, 1917.

The object is to obtain a mixture of pure nitrogen and hydrogen for the catalytic manufacture of ammonia by the Haber process. Coal which is low in sulphur and rich in nitrogen is washed to remove iron pyrites, and is mixed with iron oxide and calcium carbonate, or other sulphur retainer, and fed into the gas producer A at C, and coked. The gas is withdrawn at E, purified from tar and ammonia, and used for heating and power purposes. Air is blown in at D, and the coke passes down into a special producer B. A mixture of

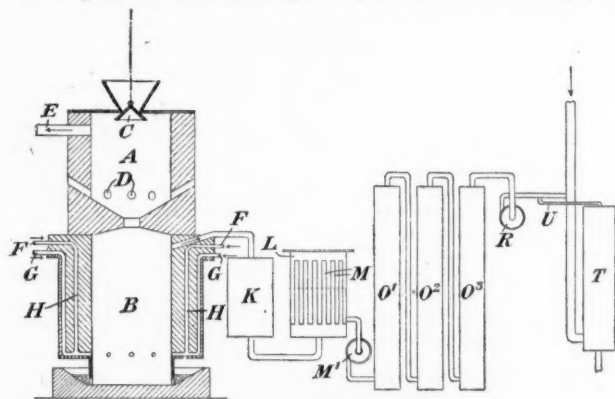
are removed, and dust and tar are then removed. The necessary volume of steam is then added so that when the mixture is passed over a catalyst such as iron oxide in the chamber L, any carbon monoxide is converted into dioxide and hydrogen, and carbon bisulphide into sulphuretted hydrogen, which is then removed by passing over iron oxide. The residue of carbon monoxide is removed by adding air and passing over a low temperature catalyst. The gas mixture is then compressed to 10 atmospheres to remove water, which is passed through a heat interchanger. The gas then passes through the blower M' to a series of towers O¹, O², where it is treated with ammonia and water in counter-current so that ammonium bicarbonate is produced. This may be used for producing sodium bicarbonate or ammonium sulphate in the known manner. The ammonia may be obtained directly from the Haber plant. After all the carbon dioxide and ammonia are removed by this treatment, the gas is washed with water in a tower O³ and is compressed by the compressor R to 100-150 atmospheres. The water thus condensed passes by the pipe U to the tower T where it abstracts the last trace of ammonia from the circulating gases in the Haber plant. The gas is washed with strong caustic soda or potash to remove traces of water, filtered, warmed, and passed into the Haber plant.

142,902. ORGANIC SUBSTANCES, PROCESS OF PURIFICATION OF—BY SUBLIMATION. The Seldon Co., and J. M. Selden, 810, House Building, Pittsburgh, Pa., U.S.A. Application date, February 3, 1919.

The process is for separately obtaining a number of organic substances from mixtures which are solid at ordinary temperature and which contain substantial proportions of each substance. The mixture is heated to a point below the boiling point of the most volatile constituent in a current of inert gas, usually air, and the gaseous mixture is then successively and progressively cooled so that the constituents are fractionally crystallised out of the gas. Examples are given of the recovery of anthracene from crude anthracene press cake containing methyl anthracene, phenanthrene and carbazole; the separation of phthalic anhydride from naphthalene; the purification of crude anthraquinone; the purification of crude naphthalene; and the separation of benzoic and salicylic acids from impurities. The mixture to be separated may, in some cases, be treated with a reagent which will convert one or more of the constituents into a non-volatile product, before the mixture is heated, e.g., crude anthracene may be treated with caustic soda to convert the carbazole into its sodium salt.

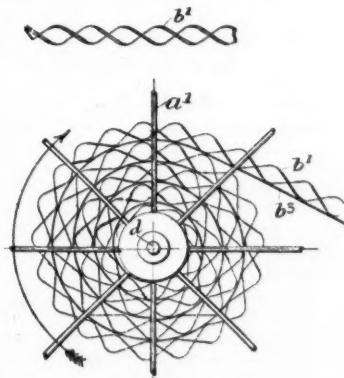
142,941. TREATING AIR OR GASES WITH LIQUIDS, APPARATUS FOR. W. J. Bulgin, 191, Selly Oak Road, King's Norton, E. A. Hall, 278, Selly Oak Road, King's Norton, and G. Searle, 48, Umberslade Road, Selly Oak, all in Birmingham. Application dates, February 17 and July 29, 1919.

The apparatus is of the type in which gas is passed through a casing containing rotating members which dip into liquid in



142,874

steam, air and oxygen is blown in at F and is preheated by passing through the conduit H to the bottom of the producer. Part of the air and oxygen may be passed through the passage G. The gas is blown through at a rapid rate so that the formation of carbon monoxide is avoided and carbon dioxide is formed, while the proportions are such that the resulting gas contains nitrogen and hydrogen in the required proportions. The gasification is effected at 650°-850°C., so that no clinker is formed. The gaseous mixture is passed through limestone, magnesia, or magnesian limestone in the vessel K at about 700°C., so that most of the sulphur-containing gases



142,941

the bottom of the casing. The rotating members consist of a helical strip b' which is wound in spiral form into a disc, the

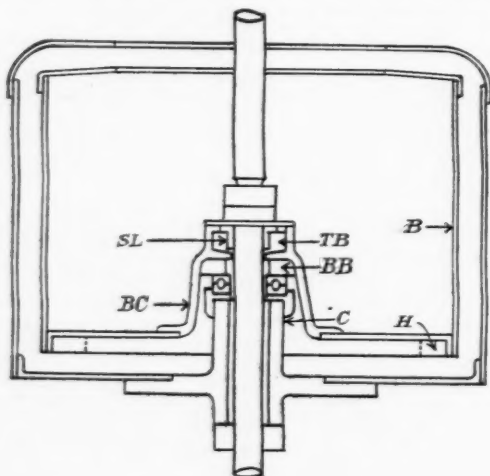
coils being supported by the radial arms *a'*. A number of such discs may be mounted transversely on a rotating shaft *d* in a casing. The spiral coils may be separated by a flat strip *b'* of channel section.

- 142,947. AROMATIC ARSENIC ACIDS, PROCESS OF PREPARING. A. Mouneyrat, 20, Rue de l'Abbé de l'Epée, Paris. Application date, February 20, 1919.

An aqueous or dilute alcoholic solution of arsenious acid is treated with the diazo compound of an aromatic amine in an acid, neutral, or alkaline medium, either cold or warm. Two catalysts are also added, one being a copper salt and the other a reducing agent which is selected according to the medium used, e.g., hypophosphorous acid, sodium hydrosulphite, sodium formaldehyde hydrosulphite, &c.

- 142,949. SELF-BALANCING CENTRIFUGAL OR HYDRO EXTRACTOR BASKET. W. McChesney, 64, Mill Hill Road, Acton, London, W.3. Application date, February 21, 1919.

The basket B for extracting liquids by centrifugal force is supported on a column C, a rubber buffer BB being interposed between the central portion BC of the basket and the column.



142,949

A similar buffer TB is interposed between the central portion BC and the sleeve SL. The bottom of the basket is weighted by a ring H and the point of support on the column C is between the centre of the basket and its centre of gravity. With this construction a minimum of oscillation takes place when the basket is unbalanced.

- 143,002 and 143,082. ELECTROLYSING LIQUIDS. APPARATUS FOR. J. S. Withers, London. (From National Electro-Products, Ltd., 83, Church Street, Toronto, Canada). Application dates, April 23 and June 26, 1919.

143,002. A bi-polar electrode for use in the electrolysis of a caustic solution for the production of oxygen and hydrogen, has a separate chamber formed behind each face, the chambers being divided by vertical partitions into a number of separate compartments communicating with a common space at the top. Each face of the electrode has a series of transverse ribs of zigzag form, and gas openings are provided into the compartments at the angles of the ribs, both above and below them. Each electrode is enclosed in a porous sheath, and the construction ensures that oxygen and hydrogen of a high degree of purity are obtained.

143,082. In apparatus of the type described above, a lighter electrode is obtained and the formation of destructive arcs between adjacent conductors is avoided, by providing an electrode-supporting frame of non-conducting material having gas chambers at the top on both sides of a central plate. The electrode is formed of wire wound helically on the frame below the open bottom of the gas chambers.

- 143,064. REMOVING CARBON AND SULPHUR DEPOSITS IN HYDROGEN GAS MANUFACTURE. Blair, Campbell & McLean, Ltd., D. A. Blair and J. L. Ferguson, Woodville Street, Govan, Glasgow. Application date, June 11, 1919.

In the steam-iron process for manufacturing hydrogen, the gas becomes contaminated with carbon monoxide and sulphuretted hydrogen from the carbon and sulphur deposited in the retorts by the reducing gas used for reducing the oxide. This is avoided by passing air enriched with oxygen through the retorts to burn out the impurities. The oxygen may be obtained from manganese dioxide and potassium chlorate, or bleaching powder and cobalt oxide, and air may be drawn through the oxygen-producing retorts to enrich it with oxygen.

- 143,176. ELECTRIC FURNACES. W. E. Moore, Union Bank Building, Pittsburgh, Pa., U.S.A. Application date, February 14, 1919.

The furnace is of the tilting type in which the electrode-holders are raised and lowered by cables and winding drums. To avoid damage to the motor winches from the fumes and heat, they are placed in a chamber below the charging platform, and the hoisting cables pass downwards through hollow columns fixed at their lower ends to the furnace.

NOTE.—The following specifications, which are now accepted, were abstracted when they became open to inspection under the International Convention: 137,296 (Fabriques de Produits Chimiques de Thann et de Mulhouse), relating to potassium sulphate; and 138,862 (Fredriksstad Elektrokemiske Fabriker Aktieselskabet F.E.F.), relating to electrolysis of a metal salt. (See THE CHEMICAL AGE, Vol. II., pages 287 and 478).

International Specifications Not Yet Accepted

- 141,324. ALUMINIUM AND ITS ALLOYS. A. Strasser, 5, Blumenstrasse, Rorschach, Switzerland. International Convention date, April 9, 1919.

Aluminium or an alloy containing aluminium is heated above its melting point and an aluminium cartridge containing potassium phosphide is added. Silicon, iron and oxygen are thus converted into phosphorus compounds. A similar aluminium cartridge containing an alkaline earth metal or lithium is then added to decompose the phosphorus compounds, and the resulting products float on the surface of the aluminium.

- 141,333. AROMATIC ACIDS. Commercial Research Co., Jackson Avenue, Long Island City, New York. (Assignees of H. W. Walker, 49, Wall Street, New York, and V. Coblenz, 75, Washington Street, Long Branch, N.J., U.S.A.). International Convention date, April 7, 1919.

The side chains of toluene or other aromatic compounds are oxidised by dilute nitric acid of 36–43 per cent. strength at an elevated temperature. The liquid is not agitated, but the layers of acid and toluene are allowed to remain in contact for several days. A reducing agent such as formaldehyde, para-formaldehyde, copper, zinc, starch, &c., which causes the evolution of oxides of nitrogen, is added to start the reaction, and the oxides of nitrogen evolved are condensed and returned. Alternatively, the nitric acid may be replaced by oxides of nitrogen. The resulting benzoic acid obtained from toluene is purified by converting it into its sodium or calcium salt. Ethylbenzene may be similarly oxidised, and also *o*-nitrotoluene to *o*-nitrobenzoic acid, xylenes to toluic and phthalic acids, and *o*-cresol esters to salicylic acid.

- 141,351. REFRACTORY AND ABRASIVE COMPOSITIONS. E. Assie, Jarrie, Isère, France. International Convention date, August 9, 1917.

Bauxite is heated with carbon in such amount that all oxides other than alumina are reduced, and a proportion of chromium oxide. The resulting slag consists of crystallised alumina and an iron alloy, with a binder of chromium oxide. The proportion of chromium oxide should be just sufficient to reduce the whole of the iron oxide.

- 141,352. ARTIFICIAL CORUNDUM, ELECTRIC FURNACES FOR MAKING. E. Assie, Jarrie, Isère, France. International Convention date, August 9, 1917.

The furnace is for obtaining refractory material, such as

corundum, in masses of predetermined weight and with slow cooling. The hearth is composed of a mixture of graphite and tar contained in a casing to which terminals are attached. The sides of the furnace are lined with a mixture of calcined magnesite 1 part, dehydrated bauxite 1 part, waste material, such as corundum dust from previous operations 2 parts, and carbon sufficient to reduce any heavy metal compounds in the bauxite, together with tar, starch, or other binder. This lining is supported by an outer lining of graphite and tar.

141,361. ACRYLEIN. C. Moureu, C. Dufrasse, P. Robin, and J. Pougnet, Paris. International Convention date, April 8, 1919.

Pyrogallol, pyrocatechol, hydroquinone, gallic acid, tannin, &c., are added to acrolein in the proportion of 0.1 to 1.0 per cent. to stabilise it.

141,374. TREATING GASES WITH LIQUIDS. H. Frischer, 6, Kaiserstrasse, Zehlendorf, Berlin, and M. Drees, 43, Sonderburgerstrasse, Cologne. International Convention date, October 29, 1917.

Liquids and gases are brought into contact in a tower which is divided into compartments by horizontal and vertical partitions in such a way that the gas flows alternately in the same direction as, and in the opposite direction to, the liquid.

LATEST NOTIFICATIONS.

144,260. Sulphide ores and metallurgical products, recovery of lead and silver from. Amalgamated Zinc (De Bay's), Ltd. May 17, 1919.

144,266. Caustic soda or soda lye, production of. Schweizerische Sodafabrik. June 4, 1919.

144,283, 144,304. Fluids, apparatus for regulating the volume of flow or pressure of. J. H. Reineke. February 16, 1916, February 23, 1918.

144,295. Electrodes, apparatus for cooling. Siemens-Schuckertwerke Ges. June 4, 1918.

144,306. Sulphur from sulphur dioxide, method of making. American Smelting & Refining Co. September 9, 1918.

144,310. Azodyestuffs, manufacture of new. Farbenfabriken Vorm. F. Bayer & Co. July 16, 1918.

Specifications Accepted, with Date of Application

7 122,169. Benzene, Process of sulphonating. Barrett Co. January 5, 1918.

124,219. Methyl derivative of arylamino compounds, Process for the production of. A. Mailhe. April 21, 1917.

131,600. Ethylacetate from paraldehyde as the primary material, Process of manufacture of. Soc. des Acieries et Forges de Firminy. March 13, 1918.

136,833. Ammonium and sodium sulphate from coke-oven and like gases, Process for recovering—by the use of bisulphate of sodium. Soc. Industrielle de Produits Chimiques. May 27, 1918.

143,602. Carbonisation and gasification plant and the like. W. E. Davies. February 21, 1919.

143,619. Electrodes for electrolytic recovery of metals from solutions. H. Wade. (Central Mining & Investment Corporation). February 24, 1919.

143,620. Electrolytic recovery of metals from their solutions. H. Wade. (Central Mining & Investment Corporation). February 24, 1919.

143,641. Coal-gas, Purification of. F. W. Berk & Co., and J. J. Hood. February 28, 1919.

143,651. Acid-proof and oil-proof containers. T. W. Jones. March 5, 1919.

143,681. Sulphonated products of mineral oils, and process of producing the same. W. J. Mellersh-Jackson. (Twitchell Process Co.). April 5, 1919.

143,682. Sulphonic acids of mineral oils, and process of producing the same. W. J. Mellersh-Jackson. (Twitchell Process Co.). April 5, 1919.

143,683. Alkali metal sulphonate, and process of producing the same. W. J. Mellersh-Jackson. (Twitchell Process Co.). April 5, 1919.

143,775. Liquids, gases, and the like, Method of intermixing. O.F. Bruman. September 10, 1919.

Applications for Patents

Bloxam, A. G., and Akt.-Ges. für Anilin Fabrikation. Manufacture of ortho-oxy-azo-dyestuffs. 15,515. June 8.

Bloxam, A. G., and Akt.-Ges. für Anilin Fabrikation. Manufacture of azo-dyestuffs for wool. 15,637. June 9.

Bloxam, A. G., and Akt.-Ges. für Anilin Fabrikation. Manufacture of resinous substances. 15,774. June 10.

Badische Anilin & Sodafabrik. Manufacture and production of readily soluble tanning extracts or agents. 15,456. June 8. (Germany, January 29, 1914.)

Badische Anilin & Sodafabrik. Manufacture and production of yellow colouring matters for dyeing animal fibres. 15,457. June 8. (Germany, April 14, 1914.)

Badische Anilin & Sodafabrik. Process for transforming ammonia into a salt for use as a fertiliser. 15,458. June 8. (Germany, July 10, 1915.)

Badische Anilin & Sodafabrik. Manufacture of readily soluble tanning extracts or agents. 15,609. June 9. (Germany, December 19, 1913.)

Benson, M. Process of treating volatile compounds. 15,383. June 7.

British Dyestuffs Corporation. Manufacture of symmetrical alkylated metaphenylene-diamines. 15,864. June 11.

Carbic, Ltd. Manufacture of calcium carbide cakes. 15,603. June 9.

Drey, N. Detergents and bleaching compounds, &c. 15,393. June 8.

Dreyfus, H. Manufacture of cellulose products. 15,736. June 10.

Durden, F. Apparatus for extraction of oils from nuts, seeds, &c. 15,887. June 11.

Elektro-Osmose Akt.-Ges. (Graf. Schwerin Ges.) Electro-osmotic separation of substances. 15,775. June 10. (Germany, April 8, 1918.)

Elektro-Osmose Akt.-Ges. (Graf. Schwerin Ges.) Process for decolorising liquids containing glycerine or crude glycerine. 15,882. June 11. (Germany, February 12, 1919.)

Goldschmidt, Akt.-Ges. T. Process for preparation of solid substances for chemical operations. 15,479. June 8. (Germany, July 25, 1918.)

Grant, J. C. Apparatus for agitating liquids. 15,617. June 9.

Green, A. G. Manufacture of symmetrical alkylated metaphenylene-diamines. 15,864. June 11.

Kinzlberger & Co. Process for purification of crude anthracene. 15,354 and 15,454. June 7 and 8. (Austria, October 30, 1910.)

Krupp Akt.-Ges. Grusonwerk, F. Extracting metals from metallic compounds, ores, foundry products, furnace dust, &c. 15,884. June 11. (Germany, June 3, 1919.)

Mauclere, P. A. P. V. Storage and distribution of inflammable, &c., liquids. 15,643. June 9. (France, February 19, 1919.)

Moffat, J. W. Reduction of metallic oxide ores. 15,519. June 8.

Moseley, J. F. Detergents and bleaching compounds, &c. 15,393. June 8.

Muntz, W. E. Improving efficiency of propulsion and or cleavage between a fluid and a solid or between fluids. 15,204. June 7.

Nitrum Akt.-Ges. and Schellenberg, H. Process for production of a solid neutral fertiliser containing nitrogen and phosphorus. 15,708. June 10. (Switzerland, June 28, 1919.)

Perry, W. P. Apparatus for distilling carbonaceous material. 15,341. June 7.

Pestalozzi, G. A. Method for producing tar of aliphatic compounds or low-temperature tar. 15,651. June 9. (Switzerland, June 20, 1919.)

Poore, P. Retorts for destructive distillation of carbonaceous substances, &c. 15,386. June 7.

Sharp, F. F. Centrifugal or rotary pumps, &c. 15,928. June 12.

Sharples, P. T. Process for separating substances from liquids. 15,577. June 9.

Thermal Industrial & Chemical (T.I.C.) Research Co. Process for de-tinning iron. 15,516. June 8.

United Alkali Co. Manufacture and production of graphite electrodes. 15,349. June 7.

United Oil & Coal Corporation. Means for mixing pulverulent and liquid fuel. 15,487, 15,488. June 8.

Waterhouse, C. N. Manufacture of calcium carbide cakes. 15,603. June 9.

A New Use for Slag

THE Germans during the war, when materials were short, gave a certain amount of attention to the utilisation of blast-furnace slags, and succeeded in obtaining a satisfactory cement after many experiments. A new use for slag is foreshadowed in an article in *Stahl und Eisen*, viz., for the manufacture of light bricks for building purposes. By passing molten slag horizontally through water, the steam generated blows out or extrudes the slag jet, and forms what the Germans term "spume" slag or artificial pumice-stone. This material has been patented under the name of "thermosite," owing to its excellent heat-insulating properties. The patentee has also invented a press for pressing bricks formed of small pieces of this artificial pumice and a mixture of slag, sand, and slaked lime which is used as a binder. The bricks, thus formed are strong and light, and resemble in their properties the alluvial (tuff) stone obtained in the neighbourhood of Andernach. As, in addition, they can be pressed to large dimensions, less mortar will be required in building operations. The German authorities have approved of the new type of bricks for house-building.

Monthly Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

British Market Report

THURSDAY, June 17.

There has been a satisfactory increase in the volume of business during this week with comparatively little fluctuations in price.

Manufacturers are still reluctant sellers on account of their heavy commitments and the general tone is satisfactory.

The export demand is particularly active, but the volume of business is very much restricted by the continued shortage of supplies.

General Chemicals

ACETONE has met with good request on export account and price is well maintained.

ACID ACETIC.—A satisfactory volume of business is passing through and arrivals are quickly absorbed.

ACID CARBOLIC remains a quiet and easy market.

ACID CITRIC is again rather easier owing to the continual offers of second-hand parcels. Makers' prices, however, are fully maintained.

ACID FORMIC is in better demand at recent values.

ACID OXALIC is perhaps a shade firmer and a steady business is reported.

ACID TARTARIC.—Makers show no inclination to reduce price, but the market remains affected by profit taking.

AMMONIUM SALTS are steadily inquired for and with only small supplies available there is a tendency towards advance in price.

ARSENIC has been rather more active but without change in value.

BARIUM SALTS.—There has been a good demand for chloride, manufacturers are well sold for the next few months, and prices remain unaltered.

BLEACHING POWDER has been in strong demand for export and the price has been fully maintained.

COPPER SULPHATE is weaker and the demand is still very poor.

FORMALDEHYDE.—A few parcels have been offered at slightly lower rates for forward delivery, but the spot price is maintained, and with the continued scarcity of methyl alcohol there is little relief to be expected for some time to come.

LEAD SALTS are quiet and easy with little business passing.

LITHOPONE has met with fair request and there is no change to report in price.

POTASSIUM PERMANGANATE.—The demand still continues good for this product and the price has just lately been advanced on the Continent. Higher prices may be expected shortly.

POTASSIUM PRUSSATE has met with good inquiry and spot parcels are scarce.

SODA CAUSTIC has been in good demand for export and is firmer in tone.

SODIUM NITRITE.—Rather more business has been done since we reported last week, but the demand is still rather slow.

SODIUM PHOSPHATE is still very scarce for spot delivery and the price if anything is firmer.

TIN SALTS remain a quiet and easy market.

ZINC SALTS.—Sulphate has been in fair request but prices remain unchanged.

Coal Tar Intermediates

There is very little change in the market since our last issue and prices continue very firm.

ALPHA NAPHTHOL.—There is a strong demand and there has been a sharp advance in price.

ALPHA NAPHTHYLAMINE is in good request and the recent price is maintained.

ANILINE OIL AND SALT are in better demand and prices are maintained.

BETA NAPHTHOL.—The position is unchanged and the price is fully maintained. Spot parcels are very scarce and manufacturers are booked well ahead.

DIMETHYLANILINE is in request, but no supplies are obtainable.

DIPHENYLAMINE is in good demand but supplies are short.

PARANITRANILINE is in good request, but only very small quantities are available and the price is fully maintained.

XYLIDINE is in better demand at the previous price.

Coal Tar Products

There is no change in our market since last week.

90'S BENZOL is stiffening slightly and is worth about 2s. 11d. on rails.

PURE BENZOL is still scarce at about 3s. 4d. per gallon.

CREOSOTE OIL remains steady at 1s. to 1s. 1d. in the North, and 1s. 1d. to 1s. 2d. in the South.

SOLVENT NAPHTHA 90/160 is slightly firmer at a price of about 2s. 11d. on rails.

HEAVY NAPHTHA 90/190 is in good demand at 3s. 6d. per gallon.

NAPHTHALENE.—Supplies of naphthalene, particularly the crude qualities, are rather freer. Crude is worth about £14 to £18 per ton and refined from £36 to £40.

PITCH.—The position remains unchanged and very little business has been reported during the last week.

Sulphate of Ammonia

The demand for Home consumption remains good. Export business is at a standstill.

French Market Report

This market is quiet and buyers show a lack of interest. There are few changes in price, however, and spot parcels are changing hands at last quoted figures. A fair quantity of Potash has arrived from Germany under the terms of the Peace Treaty, but arrivals of other products are unimportant.

The production of Phosphate is now increasing. There is a great shortage of Basic Slag. The import of Wood products has been practically impossible owing to Exchange, and home manufacture is carried on under great difficulties, due to the shortage of fuel and labour troubles.

A quantity of Acetone has been imported lately from England.

It is reported that French Dye works produced 609 tons of Dye during May.

AMMONIUM PHOSPHATE.—Buyers are now showing interest. The price is about £135 per ton.

ACETONE is equal to £125 per ton.

LACTIC ACID is equal to £70 per ton.

OXALIC ACID is 2s. 11d. per lb.

SULPHATE OF ALUMINA is in much better request at £19 per ton.

FORMALDEHYDE is equal to £350 per ton.

LEAD ACETATE is quoted at £90 per ton.

LITHOPONE is in better request at £58 per ton.

NAPHTHALENE is improving and stocks appear to be now moving off.

SODIUM BISULPHITE is in great request at about £56 per ton.

SODIUM HYPOSULPHITE is almost unobtainable at £50 per ton.

SODIUM SULPHIDE continues to be in request and fancy prices are paid at up to £65 per ton.

ZINC SULPHATE is quiet at £25 per ton.

PRUSSATES are on the easy side with Potash standing at 2s. 5d. per lb. and Soda at about 1s. 11d. per lb.

German Market Report

The German Chemical market is still in a very peculiar and unsatisfactory condition. The German authorities claim to have caused the cessation of the illicit trade which has been going on. No products are allowed to be imported or

exported except under licence, which, for most products, are only sparingly granted. In sympathy with attempts in other markets, buyers are holding back and trying to force prices downwards. It is noteworthy, however, that manufacturers' prices are increasing, and it is only with materials in weak second hands that price concessions are made.

Metal salts are declining, but otherwise for spot material many prices have an upward tendency.

There is demand for all heavy Soda products, Acetone, Dextrine, &c. These are scarce and dear. The position appears to be slightly improving and indications go to show that manufacturers are beginning to take up some of their old productions.

ZINC SULPHATE stands at £25 per ton.

POTASH PERMANGANATE, 5s. 6d. per lb.

LITHOPONE, £51 per ton.

SODIUM BISULPHITE, £52 per ton.

PRUSSIAN OF POTASH, 2s. 1d. per lb.

CHROME ALUM, £130.

LACTIC ACID, £80 per ton.

HYPOSULPHITE OF SODA, £50 per ton.

FLAKE NAPHTHALINE, £50 per ton.

CAUSTIC SODA, £45 per ton.

Current Prices Chemicals

	per	£	s.	d.		per	£	s.	d.
Acetic anhydride	lb.	0	3	6	to	0	3	9	
Acetone oil	ton	90	0	0	to	95	0	0	
Acetone, pure	ton	120	0	0	to	125	0	0	
Acid, Acetic, glacial, 99-100%	ton	120	0	0	to	122	10	0	
Acetic, 80% pure	ton	97	0	0	to	98	10	0	
Arsenic	ton	100	0	0	to	105	0	0	
Boric, cryst.	ton	74	10	0	to	76	0	0	
Carbolic, cryst. 39-40%	lb.	0	1	3	to	0	1	3½	
Citric	lb.	0	5	9	to	0	6	0	
Formic, 80%	ton	120	0	0	to	—			
Gallic, pure	lb.	8	6	to	0	8	9		
Hydrofluoric	lb.	0	0	7	to	0	0	8	
Lactic, 50 vol.	ton	62	0	0	to	63	0	0	
Lactic, 60 vol.	ton	75	0	0	to	77	10	0	
Nitric, 80 Tw.	ton	41	0	0	to	44	0	0	
Oxalic	lb.	0	2	11	to	0	3	0	
Phosphoric, 1.5	ton	65	0	0	to	67	0	0	
Pyrogallol, cryst.	lb.	0	11	6	to	0	11	9	
Salicylic, Technical	lb.	0	2	10	to	0	3	0	
Salicylic, B.P.	lb.	0	3	8	to	0	3	10	
Sulphuric, 92-93%	ton	8	0	0	to	8	10	0	
Tannic, commercial	lb.	0	5	0	to	0	5	3	
Tartaric	lb.	0	4	0	to	0	4	2	
Alum, lump	ton	19	10	0	to	20	0	0	
Alum, chrome	ton	93	0	0	to	95	0	0	
Alumino ferric	ton	9	0	0	to	9	10	0	
Aluminium, sulphate, 14-15%	ton	17	10	0	to	18	10	0	
Aluminium, sulphate, 17-18%	ton	20	10	0	to	21	10	0	
Ammonia, anhydrous	lb.	0	2	2	to	0	2	4	
Ammonia, .880	ton	52	0	0	to	57	0	0	
Ammonia, .920	ton	42	0	0	to	46	0	0	
Ammonia, carbonate	lb.	0	0	7½	to	—			
Ammonia, chloride	ton	115	0	0	to	120	0	0	
Ammonia, muriate (galvanisers) ..	ton	60	0	0	to	65	0	0	
Ammonia, nitrate	ton	60	0	0	to	65	0	0	
Ammonia, phosphate	ton	130	0	0	to	135	0	0	
Ammonia, sulphocyanide	lb.	0	2	3	to	0	2	6	
Amyl, acetate	ton	400	0	0	to	405	0	0	
Arsenic, white, powdered	ton	67	10	0	to	70	0	0	
Barium, carbonate	ton	13	10	0	to	14	10	0	
Carbonate, 92-94%	ton	14	10	0	to	15	0	0	
Barium, chloride	lb.	0	1	4	to	0	1	5	
Chloride	ton	36	0	0	to	37	0	0	
Barium, Nitrate	ton	55	0	0	to	56	0	0	
Sulphate, blanc fixe, dry	ton	25	10	0	to	26	0	0	
Sulphate, blanc fixe, pulp	ton	15	10	0	to	16	0	0	
Bleaching powder, 35-37%	ton	18	10	0	to	19	10	0	
Borax crystals	ton	41	0	0	to	42	10	0	
Calcium acetate, Brown	ton	20	0	0	to	21	0	0	
Grey	ton	35	0	0	to	37	10	0	
Calcium Carbide	ton	30	0	0	to	32	0	0	
Chloride	ton	9	10	0	to	10	10	0	
Carbon bisulphide	ton	58	0	0	to	59	0	0	
Casein, technical	ton	80	0	0	to	83	0	0	
Cerium oxalate	lb.	0	3	9	to	0	4	0	
Chromium acetate	lb.	0	1	2	to	0	1	4	
Cobalt acetate	lb.	0	8	0	to	0	8	3	
Oxide, black	lb.	0	10	0	to	0	10	3	
Copper chloride	lb.	0	1	3	to	0	1	6	
Sulphate	ton	45	0	0	to	46	0	0	

	per	£	s.	d.		per	£	s.	d.
Cream Tartar, 98-100%	ton	295	0	0	to	300	0	0	
Epsom salts (see Magnesium sulphate)									
Formaldehyde 40% vol.	ton	345	0	0	to	350	0	0	
Formosol (Rongalite)	lb.	0	4	0	to	0	4	3	
Glauber salts	ton	Nominal.							
Glycerine, crude	ton	70	0	0	to	72	10	0	
Hydrogen peroxide, 12 vols.	gal.	0	2	8	to	0	2	9	
Iron perchloride	ton	50	0	0	to	52	0	0	
Iron sulphate (Copperas)	ton	4	15	0	to	5	0	0	
Lead acetate, white	ton	90	0	0	to	92	10	0	
Carbonate (White Lead)	ton	70	0	0	to	72	10	0	
Nitrate	ton	72	0	0	to	75	0	0	
Litharge	ton	62	10	0	to	65	0	0	
Lithopone, 30%	ton	59	0	0	to	61	0	0	
Magnesium chloride	ton	15	10	0	to	16	10	0	
Carbonate, light	cwt	2	15	0	to	3	0	0	
Sulphate (Epsom salts commercial)	ton	14	0	0	to	14	10	0	
Sulphate (Druggists')	ton	18	10	0	to	19	10	0	
Manganese, Borate	ton	190	0	0	to	—			
Sulphate	ton	105	0	0	to	110	0	0	
Methyl acetone	ton	95	0	0	to	100	0	0	
Alcohol, 1% acetone	gall.	Nominal.							
Nickel ammonium sulphate, single salt	ton	50	0	0	to	52	10	0	
Potassium bichromate	lb.	0	2	2	to	0	2	3	
Potassium Carbonate, 90%	ton	115	0	0	to	120	0	0	
Chloride	ton	Nominal.							
Chlorate	lb.	0	0	10	to	0	0	10½	
Meta-bisulphite, 50-52%	ton	270	0	0	to	280	0	0	
Nitrate, refined	ton	70	0	0	to	72	0	0	
Permanganate	lb.	0	5	9	to	0	6	0	
Prussiate, red	lb.	0	6	0	to	0	6	3	
Prussiate, yellow	lb.	0	2	3	to	0	2	4	
Sulphate, 90%	ton	31	0	0	to	33	0	0	
Salammoniac, firsts	cwt.	5	15	0	to	—			
Seconds	cwt.	6	0	0	to	—			
Sodium acetate	ton	61	0	0	to	63	0	0	
Arsenate, 45%	ton	60	0	0	to	62	0	0	
Bicarbonate	ton	10	10	0	to	11	0	0	
Bichromate	lb.	0	1	11	to	0	2	0	
Bisulphite, 60-62%	ton	50	0	0	to	52	10	0	
Chlorate	lb.	0	0	5½	to	0	0	6½	
Caustic, 70%	ton	43	10	0	to	44	10	0	
Caustic, 76%	ton	44	10	0	to	45	10	0	
Hydrosulphite, powder, 85%	lb.	0	4	0	to	0	5	0	
Hyposulphite, commercial	ton	37	10	0	to	40	0	0	
Nitrite, 96-98%	ton	100	0	0	to	105	0	0	
Phosphate, crystal	ton	40	0	0	to	42	0	0	
Perborate	lb.	0	2	2	to	0	2	4	
Prussiate	lb.	0	1	9	to	0	1	9½	
Sulphide, crystals	ton	30	0	0	to	32	0	0	
Sulphide, solid, 60-62%	ton	62	10	0	to	65	0	0	
Sulphite, cryst.	ton	15	10	0	to	16	10	0	
Strontium carbonate	ton	85	0	0	to	90	0	0	
Nitrate	ton	90	0	0	to	95	0	0	
Sulphate, white	ton	8	10	0	to	10	0	0	
Sulphur chloride	ton	42	0	0	to	44	10	0	
Sulphur, Flowers	ton	24	0	0	to	26	0	0	
Roll	ton	24	0	0	to	26	0	0	
Tartar emetic	lb.	0	3	5	to	0	3	6	
Tin perchloride, 33%	lb.	0	2	6	to	0	2	7	
Perchloride, solid	lb.	0	3	0	to	0	3	3	
Perchloride (tin crystals)	lb.	0	2	0	to	0	2	1	
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0	
Chloride, solid, 96-98%	ton	60	0	0	to	65	0	0	
Oxide, 99%	ton	82	10	0	to	85	0	0	
Oxide, 94-95%	ton	70	0	0	to	72	10	0	
Dust, 90%	ton	90	0	0	to	92	10	0	
Sulphate	ton	21	10	0	to	23	10	0	

Coal Tar Intermediates, &c.

	per	£	s.	d.		per	£	s.	d.
Alphanaphthol, crude	lb.	0	4	0	to	0	4	3	
Alphanaphthol, refined	lb.	0	5	0	to	0	5	3	
Alphanaphthylamine	lb.	0	4	0	to	0	4	3	
Aniline oil, drums extra	lb.	0	1	8	to	0	1	9	
Aniline salts	lb.	0	1	10	to	0	2	0	
Anthracene, 85-90%	lb.	—			to	—			
Benzaldehyde (free of chlorine)	lb.	0	5	6	to	0	6	0	
Benzidine, base	lb.	0	12	6	to	0	13	6	
Benzidine, sulphate	lb.	0	10	0	to	0	11	0	
Benzoic acid	lb.	0	5	6	to	0	6	0	
Benzoate of soda	lb.	0	5	6	to	0	6	0	
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3	
Betanaphthol benzoate	lb.	1	6	0	to	1	7	6	
Betanaphthol	lb.	0	5	3	to	0	5	6	
Betanaphthylamine, technical	lb.	0	8	6	to	0	9	6	
Croceine Acid, 100% basis	lb.	0	5	0	to	0	6	3	

	per	£	s.	d.	to	£	s.	d.
Dichlorbenzol	lb.	0	0	6	to	0	0	7
Diethylaniline	lb.	0	7	9	to	0	8	6
Dinitrobenzol	lb.	0	1	5	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	4	to	0	1	6
Dinitrotolual	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	2	3	to	0	2	6
Dimethylaniline	lb.	0	5	0	to	0	5	6
Diphenylamine	lb.	0	5	0	to	0	5	3
H-Acid	lb.	0	14	6	to	0	15	0
Metaphenylenediamine	lb.	0	5	9	to	0	6	0
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7)	lb.	0	7	6	to	0	8	0
Naphthionic acid, crude	lb.	0	5	6	to	0	6	0
Naphthionate of Soda	lb.	0	6	0	to	0	6	6
Naphthylamin-di-sulphonic-acid	lb.	0	5	6	to	0	6	6
Nitronaphthaline	lb.	0	1	3	to	0	1	4
Nitrotolual	lb.	0	1	4	to	0	1	6
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	2	to	0	1	4
Orthotoluidine	lb.	0	2	6	to	0	2	9
Orthonitrotolual	lb.	0	1	7	to	0	1	8
Para-amidophenol, base	lb.	0	15	0	to	0	16	0
Para-amidophenol, hydrochlor	lb.	0	15	6	to	0	16	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	8
Paranitraniline	lb.	0	8	3	to	0	8	9
Paranitrophenol	lb.	0	2	6	to	0	2	9
Paranitrotolual	lb.	0	5	3	to	0	5	6
Paraphenylenediamine, distilled	lb.	0	13	6	to	0	14	6
Paratoluidine	lb.	0	7	6	to	0	8	6
Phthalic anhydride	lb.	0	5	6	to	0	6	0
R. Salt, 100% basis	lb.	0	4	0	to	0	4	2
Resorcin, technical	lb.	0	11	6	to	0	12	6
Resorcin, pure	lb.	0	17	6	to	1	0	0
Salol	lb.	0	5	9	to	0	6	0
Shaeffer acid, 100% basis	lb.	0	3	6	to	0	3	0
Sulphanilic acid, crude	lb.	0	1	5	to	0	1	6
Tolidine, base	lb.	0	10	6	to	0	11	6
Tolidine, mixture	lb.	0	3	0	to	0	3	6

The following prices are furnished by Messrs. Miles, Mole & Co., Ltd., 101, Leadenhall Street, London, E.C.

Metals and Ferro-Alloys

Aluminium, 98-99%	ton	165	0	0	to	170	0	0
Antimony, English	ton	65	0	0	to	68	0	0
Copper, best selected	ton	104	0	0	to	105	0	0
Ferro Chrome, 60%	ton	45	0	0	to	45	10	0
Manganese, 76-80%	ton	60	0	0	to	65	0	0
Silicon, 45-50%	ton	25	0	0	to	26	0	0
Tungsten, 75-80%	lb.	0	3	3	to	0	3	6
Lead Ingot	ton	39	0	0	to	40	0	0
Lead Sheets	ton	48	0	0	to	48	10	0
Nickel, 98-99%	ton	230	0	0	to	231	0	0
Tin	ton				235	0		
Zinc Sheet	ton	75	0	0	to	80	0	0
Spelter	ton	45	0	0	to	46	0	0

Structural Steel

Angles and Tees	ton	25	0	0	to	30	0	0
Flats and rounds	ton	28	0	0	to	30	0	0
Joists	ton	25	0	0	to	26	0	0
Plates	ton	24	0	0	to	25	0	0
Rails, heavy	ton	23	0	0	to	25	0	0
Sheets, 24 Gauge	ton	48	0	0	to	48	10	0
Galvd. Corrd. Sheets	ton	54	0	0	to	55	0	0

Reparation Dyes from Germany

THE actual deliveries of reparation dyes from Germany up to the end of April, according to a report published in Berlin, were as follows:

	Metric tons.	Value £.
To France	837.5	590,300
To England	647.7	461,390
To Italy	294.6	182,000
To Belgium	329.0	174,000
U.S. America	115.9	139,000

Total

Since April the total sent from the various works has been increased to about 2,600 tons, the aggregate value of which is stated to be 40 million gold marks (£2,000,000). This is about one-third of the quantity which has to be delivered from stocks. It is added that deliveries have also begun under the Treaty requirement that 25 per cent. of the German annual output, during the five years immediately after the war, shall be sent to Entente countries at fair prices. The Germans seek, however, to have this arrangement modified, and negotiations are still proceeding in reference to it.

Delivery of Caustic Soda

Bankers' Action Against Contractors

IN the Lord Mayor's Court, last week, before the Recorder (Sir Forrest Fulton, K.C.), a claim was made by Dent, Palmer & Co., bankers, Old Broad Street, E.C., against J. Spurling, Ltd., wharfingers and contractors, Peel Wharf, Bethnal Green, E., for £38 5s. 4d., the value of three drums of caustic soda deposited by the plaintiffs at the defendants' wharf, and which had been converted by the defendants.

Counsel for the plaintiffs said, that in May, 1919, his clients acquired among other goods three drums of caustic soda from Vebo, Ltd. The drums were then at defendant's wharf. Vebo, Ltd., gave a delivery order dated May 23, 1919, addressed to the defendants in respect of 37 barrels of stearine, 32 cases of palm oil soap and three drums of caustic soda. The stearine and palm oil soap had been disposed of, and no question arose in respect of them. On May 30, the defendants sent an account for their charges in respect of the three drums of caustic soda amounting to £5 6s. 6d., which the plaintiffs paid. In March of the present year the plaintiffs instructed a firm of brokers (J. Chapman & Co., 7, Leadenhall Street, E.C.), to sell the three drums of caustic soda, and gave instructions to the defendants to deliver the goods to the brokers. The defendant's replied that they had not the three drums on hand, and referred the plaintiffs to the liquidator of Vebo, Ltd. Ultimately Messrs. Chapman informed the plaintiffs that having failed to get delivery of the caustic soda they had to buy with the market against them at 45s. per cwt., and were debiting the plaintiffs with £38 5s. 4d. The plaintiffs paid that sum, and now sued the defendants for it. In June of last year Vebo, Ltd., went into liquidation, and subsequently they transferred to Messrs. Gill the whole of their holding of caustic soda. By a blunder they appeared to have given a delivery order for the caustic soda which belonged to the plaintiffs. The defendants had received the delivery order and had delivered the plaintiff's property to somebody else.

Mr. H. G. Palmer, member of the plaintiff firm, said that they had done business with Vebo, Ltd., and in May last year their account was considerably overdrawn. In order to reduce the overdraft they purchased a quantity of goods from them, of which the three drums of caustic soda were part. Originally there were six drums of caustic soda, which were sent to the Vebo factory to make soap with. In this they had utterly failed. Three drums of caustic soda had been used in the attempt, and the other three went back to the defendants. Vebo, Ltd., gave them a delivery order in respect of the three drums which had been sent to the defendants. In March last they desired to sell the caustic soda, and the firm of Chapman & Co., whom they employed to do so were unable to get delivery. That firm having sold elsewhere had to make good, and in that way they had to pay Messrs. Chapman the amount now sued for in that action.

Evidence in support of the plaintiffs' case was given by Mr. E. Langhorn, director of J. Chapman & Co., Ltd., 101, Leadenhall Street, and Mr. L. Davis, chemical merchant, 47 and 48, Langhorn Chambers, Fenchurch Street.

For the defence, Mr. W. E. Stopps, secretary of the defendant company, said on May 23 they received the delivery order from Vebo, Ltd., relating to 37 barrels of stearine, 32 cases of palm oil soap, and three drums of caustic soda. The three drums of caustic soda were not at that time in their possession. They did not arrive until May 25. The account which the plaintiff had paid was for loading charges, but they had never at any time paid rent. There were 10 drums in all of caustic soda, and they had been released by the liquidator of Vebo, Ltd., to whom credit was given for the charges. On January 20 Messrs. Gill wrote that they had made arrangements to pay the charges in accordance with the delivery order given by the liquidator, and the whole of the caustic soda was delivered. After an interval of 10 months they had an application from the plaintiffs for three of the drums. For the defendants it was suggested that their liability depended on whether they were entitled to act on the delivery order given by the liquidator of the company on January 19, 1920, as against the delivery order of the plaintiffs.

Without calling upon the plaintiffs to reply, the Recorder said he was clearly of opinion that the plaintiffs were entitled to recover in that case, and that it was an undefended action. He gave judgment for the plaintiffs for £38 5s. 4d., and costs.

Vulcanised Rubber

Mr. Peachey's Method of Cold Vulcanising

A NEW process of vulcanising rubber has been discovered by Mr. S. J. Peachey, Lecturer in Chemistry at the Manchester College of Technology. The new process is expeditious and economical, and it is claimed that the laboratory experiments have been carried far enough to prove that it will have far-reaching effects on the rubber manufacturing industry. The immediate uses to which the discovery is likely to be put are the manufacture of linoleum floor-coverings, the heavier kinds of wall-papers, and artificial leather upholstery. It will make possible the manufacture of one-piece boots without stitching, and a combination of rubber and shoddy will make felt. There will probably be future developments in the manufacture of motor tyres. The importance of Mr. Peachey's discovery is in the fact that it is a method of cold vulcanising. It makes use of the two gases, sulphuretted hydrogen and sulphur dioxide, which react on each other to produce water and free sulphur. Mr. Peachey has found that when crude rubber, either in solid form or in solution, is treated with these two gases the sulphur produced by their interaction vulcanises the rubber. If the rubber be mixed with a waste material such as sawdust or leather scraps or paper, and the mixture is vulcanised, the resultant materials will serve a variety of useful purposes.

Mr. Peachey's discovery makes this method of manufacture practicable. Under the old heat process the properties of the leather, the sawdust, or the paper would have been destroyed. It is also an important consideration that whereas the process of hot vulcanising does not permit of the use of a number of the more delicate colours, the new process will.

Alleged Advertisement Frauds

AT the Mansion House last week, before Sir Charles Hanson, M.P., G. A. Jennings, *alias* W. Watts (30), described as an organiser of a publicity company, and A. H. Dockney (25), publishers' agent, were charged with forging and effacing orders for the insertion of trade announcements in the third series of a publication called "British Foreign Buyers," and obtaining thereby large sums of money from George Toulmin & Sons, Ltd., printers, of Preston.

Among the witnesses called was W. Jacob, assistant manager to Chance & Hunt, Ltd., chemical manufacturers, 61 and 62, Gracechurch Street, E.C. He said that in February, 1919, a man whom he could not now identify called at their office with advertisement slips. He wanted to know if the one produced correctly described their goods. Witness wrote "Correct, C. & H., Ltd., W. Jacob," and stamped it with their rubber stamp. He did not fill it in as it now appeared for a nine page advertisement costing £180.

Mr. A. G. Allen, manager of the chemical department of Fl. Bourgeois, 18 and 19, Great St. Helens, E.C., said that Dockney called soliciting orders for the "British Foreign Buyers." He had always declined to give him an order. Referring to a slip produced, he said that that order had never been given for or by the authority of the firm.

The accused were committed for trial on charges of forgery, conspiracy and false pretences. Bail for Jennings was fixed at two sureties in £1,000 each, for Dockney one surety in £1,000, or two in £500 each.

Death of Mr. J. W. Hyatt

The death of the inventor, Mr. John Wesley Hyatt, took place recently at Short Hills, New Jersey, in his 83rd year. Mr. Hyatt was the inventor of celluloid, and manufactured articles made from it at a factory at Newark, New Jersey, established by his brother, Mr. I. S. Hyatt, with whom he was associated in business. Mr. Hyatt's other inventions included roller bearings for machinery, a water purifying system, now used in more than 1,000 communities, a sugar cane mill, and a lock-stitch sewing machine with 50 needles for stitching machine belting. Mr. Hyatt obtained more than 250 patents, the majority of which were for devices which proved successful. In 1914 the Society of Chemical Industry awarded him the Perkin medal.

Chemical Engineering Group

FURTHER details are published of the projected activities of the Chemical Engineering Group in connection with the Annual Meeting of the Society of Chemical Industry in Newcastle next month. In addition to the papers announced in our issue of May 22, one on "The Design of Mechanical Filters" will be read by Mr. Balfour Bramwell; this will treat of the construction of filters for dealing with large volumes of liquid, and special reference will be made to a novel development designed by the author. On July 14 the Group will hold an informal luncheon at the County Hotel, after which a visit will be paid to the works of the International Paint & Compositions Co., Ltd., at Felling-on-Tyne, where a new centrifugal machine, to be described by Mr. W. J. Gee in his paper on "A New Process for Centrifugal Filtration," will be seen under ordinary working conditions. Professor Henry Louis will preside at the conference to be held on the afternoon of July 13, and M. Paul Kestner at that arranged for the morning of July 14.

The honorary secretary announces in the *Journal of the Society of Chemical Industry*, that the first of the four series of data sheets which have been in course of preparation for some time past are now ready, and will be issued to members of the Group; they are entitled: No. 1. The Properties of Saturated Steam; No. 2. The Capacity in Gallons of Vertical Cylindrical Tanks per Foot of Depth; No. 3. The Capacity in Gallons of Hemispherical Vessels; No. 4. The Physical Properties of Sulphuric Acid. Other sheets are in active preparation, and will be issued at short intervals. The hon. secretary of the Group will welcome any suggestions from members of the Society as to suitable subjects for data sheets, or offers to supply material for their preparation.

It is expected that the first volume of the Group's "Proceedings," containing the papers read at the first two conferences, will be published by the end of this month. To secure earlier publication of papers in the future, the committee has decided that, starting with the Birmingham Conference, the proceedings at each conference shall be published separately; the numbers so issued can then subsequently be bound together to form the annual volume.

Arrangements are being made to hold a conference on "Plant for the Utilisation of Waste Products" in November or December next; a further announcement will be made shortly.

Chemical Trade Inquiries

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. No.
Malta	Soap; wax; candles	835
Greece (Athens)...	Chemicals	851
Canary Islands (Puerto Oratava)	Glassware	853
China	Glass; glassware. Replies to Statistical and Information Dept., London Chamber of Commerce, 97, Cannon Street, London	—
Morocco (Melilla)	Soap; candles	862
Brazil (Sao Paulo)	Chemicals; dyes; drugs	914
Algeria	Salts of potassium and sodium; iodides; quinine; bi-carbonate of soda.	907
Montreal	Chemicals	870
Serb-Croat-Slovene States	Chemicals; drugs	901

Anglo-South American Oilfields, Ltd.

A PETITION presented by Mr. P. B. de Clegg Mellor, solicitor, Stourbridge, and Dr. H. Beckett-Overy, Belgravia, London, for the winding up by the High Court of Justice of the above company is directed to be heard at the Royal Courts of Justice Strand, London, on June 22.

Company News

CALIFORNIA PETROLEUM CORPORATION.—The regular quarterly dividend has been declared of 1½ per cent. on the preferred stock, payable on July 1.

TRINIDAD CENTRAL OILFIELDS, LTD.—At the fourth annual meeting in London, last week, Mr. Alexander Duckham presiding, a dividend of 10 per cent. was declared.

NEW TRANSVAAL CHEMICAL.—The directors recommend a dividend of 20 per cent. on the ordinary shares, the same as for the previous year, leaving £7,141 to be carried forward.

SAN PATRICIO NITRATE.—For the year 1919 the net profit amounted to £2,418. As the company's quota for the year ended June 30, 1920, was sold, working operations have not been resumed.

BELL'S UNITED ASBESTOS CO.—The accounts for year 1919 show an available balance of £54,146, including £9,556 brought in. A balance dividend has been declared of 1s. 6d. per share, together with a bonus of 1s. per share, making 17½ per cent. for the year (against 15 per cent.).

PAN AMERICAN PETROLEUM & TRANSPORT CO.—Quarterly dividends of 3 per cent. have been declared on the "A" and "B" common stock payable on July 10. Also an extra stock dividend of 10 per cent., payable in "B" common stock to "A" and "B" stockholders of record on June 19.

ROYAL DUTCH PETROLEUM.—The dividend for 1919 has been fixed at 45 per cent. (as against 40 per cent., in 1918), 15 per cent. of which has already been paid in an interim dividend. The *Telegraaf* states that subscriptions for an issue of 107,000,000 guilders at par will open on June 14.

SANTA RITA NITRATE.—The net profit for the year 1919 amounted to £5,308. A dividend of 5 per cent., less tax, is recommended, and £308 is carried forward. Working operations were resumed in November last, and the subsequent monthly returns have been satisfactory.

ESPERANZA COPPER & SULPHUR.—The profit for the year 1919 was £2,040, and £5,158 was brought in, making £7,198, which the directors recommend be carried forward. The demand for pyrites is reviving, and already the shipments accomplished this year exceed the total shipments of last year.

MEXICAN PETROLEUM CO.—A quarterly dividend has been declared of 2½ per cent. on common stock, payable July 10. A quarterly dividend of 2 per cent. has also been declared on the preferred, payable July 1. Also an extra stock dividend of 10 per cent. in common stock to holders of common stock of record on June 19.

IDRIS HYDRAULIC TIN.—The profit for 1919 (after providing for depreciation) was £12,571, and £75 was brought in, making £12,646. A dividend of 6d. per share was paid on October 31 last amounting to £3,000, and since the close of the financial year a further dividend of 1s. per share has been paid, absorbing £6,000, leaving £3,646 to be carried forward.

MAYPOLE DAIRY.—The directors announce that they will declare and pay an interim dividend on the deferred ordinary shares on or before August 31 next. The new share certificates for the deferred ordinary shares allotted February 28 last will be ready about June 30, and will be issued to shareholders on and after that date in exchange for allotment letters and bankers' receipts.

FIREPROOF WOOD (OXYLENE) MANUFACTURING.—The statutory report states that the total number of shares allotted is 125,000 ordinary shares, of which 25,000 ordinary shares were allotted as fully paid up in part satisfaction of purchase consideration, and 100,000 ordinary shares were allotted for cash upon which the sum of £94,605 has been received. The preliminary expenses were estimated at £3,250.

"SHELL" TRANSPORT & TRADING CO.—A balance dividend has been declared of 25 per cent. (viz., 5s. per share), free of income tax, on account of profits for the year 1919, making 35 per cent. for that year (against same), payable on July 5 next. Owing to pressure of public work Lord Eustace Percy has resigned his seat on the board, and to fill the vacancy Brig.-General H. J. W. Drummond has accepted the position.

THE BRITISH PHOTOGRAPHIC INDUSTRIES, LTD.—This company announce an issue of 202,356 six per cent. cumulative preference shares, free of income tax up to 6s. in the £ (equal to £8. 11s. 5d. per cent., less tax), and 132,773 ordinary shares of £1 each, both at par. Higginson & Co., 80, Lombard Street, E.C.3, are authorised to receive subscriptions for the above,

payable 2s. 6d. per share on application, and 17s. 6d. per share on June 30, 1920.

BRITISH OIL & CAKE MILLS.—After providing for depreciation and placing £170,000 to the reserve account, the balance of profit for the year 1919 is £357,812. Adding the amount brought forward the sum available is £375,381. Of this £312,500 is absorbed by the 25 per cent. dividend on the ordinary shares. Charges to the revenue account in respect of repairs and renewals for the year have absorbed £255,000. The balance-sheet shows reserves totalling £900,000.

SCOTTISH OILS.—The report to March 31 last states that, after providing for taxation, the credit balance is £128,817. After deducting participating preference dividend of 7 per cent. for the half-year the available balance is £60,779. The directors recommend a final dividend on participating preference for five months to March at the rate of 7 per cent. per annum, less tax, and a dividend on amounts paid up on the ordinary shares at the rate of 7 per cent. per annum for the period, carrying forward £555.

AGUAS BLANCAS NITRATE.—Presiding at the annual meeting at River Plate House on Thursday, June 10, Mr. C. A. Hunt said that their oficina was closed down during practically the whole of 1919, and only re-started in February, 1920. The loss for the year was £18,121. With regard to the future of the industry, the chief feature was lower freights, which would enable buyers to place nitrate on the market at a price which would enable it to compete with other fertilisers. The coming season should prove an active one. He thought they might look forward to an era of prosperity.

LEVER BROTHERS.—Applications are invited to an issue at par of 8 per cent. cumulative "A" preference shares of £1 each. The issue is made in order to provide a portion of the cash payable in respect of the purchase, in January last, of the ordinary shares in the Niger Company, Ltd., and also to provide further capital for the requirements of the company's own business. The company invite applications for the above-named 8 per cent. cumulative "A" preference shares of £1 each at par up to, but not exceeding, 4,000,000 shares.

BRITISH GLASS INDUSTRIES.—At an extraordinary general meeting held in London on Thursday, June 10, Mr. C. Williamson Milne (the chairman) presiding, resolutions were passed: (1) to increase the capital of the company to £5,000,000 by the creation of 3,000,000 additional shares of £1 each, such additional shares to rank for participation in profits, and in winding up and in all other respects *pari passu* with the existing shares of the company; and (2) to alter the articles of association so as to give power to the company to capitalise share premium reserves.

VAR OIL & COAL.—At the statutory meeting last week Mr. L. Urquhart stated that the shale reserves in the southern portion of the property were estimated at 1,300,000 tons, and the continuation of the shale seam to the north had been found and would be tested at once as to depth in order to ascertain definite figures of increased reserves. The shale now being extracted from the present shafts was of very satisfactory quality, and much richer in oil than the average of 50 gallons per ton previously estimated. Owing to congestion on the French railways, delays had been experienced in the delivery of machinery and materials, holding up the operation of the existing oil plant. The plant was now working, however, but it was yet too early to expect figures of output.

W. CANNING & CO., LTD.—This company, which has been formed with an authorised capital of £450,000 in ordinary shares of £1 each, announces an issue of 300,000 shares at par, of which 200,000 are offered for subscription at par, payable 5s. per share on application, 5s. per share on allotment, and 10s. per share one month after allotment. The vendor will receive 100,000 shares as part of the purchase consideration. The company has been formed to acquire the well-known and old-established business of electro platers' engineers, manufacturers of, and dealers in, electro-plating plant and chemicals, polishing machinery and appliances, lacquers, acids, &c., carried on by Mr. E. R. Canning, under the style of W. Canning & Co., at Birmingham and London. The principal manufactory and warehouse is in Great Hampton Street, Birmingham, which was entirely rebuilt on modern lines about seven years ago. The engineering department is at Park Works, Salop Street, which were especially equipped in 1918 with up-to-date plant, while plating chemicals and acids are produced at Bagot Street, and lacquers at Kenyon Street Works.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Partnerships Dissolved

DOVEY, JOHN C., and SYMES, CHARLES HARRY, colour manufacturers, Golden Valley Mill, Bitton, Gloucestershire, under the style of J. C. Dovey & Co., by mutual consent as from March 4, so far as concerns C. H. Symes, who retires from the firm. All debts received and paid respectively by J. C. Dovey, who will carry on the business under the same style.

Notice of Dividend (amended)

SCOTT, WILLIAM ROBERT, residing and carrying on business at 139, Denton Street, Carlisle, Cumberland, chemist. 13s. 9d. (making 20s. in the £), with 4 per cent. statutory interest. Final. December 8, 1919, at the office of the Official Receiver, 34, Fisher Street, Carlisle.

Notice of Intended Dividend

RING, HAROLD (trading as Harold Ring & Co.), Oakleigh, Western Road, Flixton, Cheshire, trading at 5, Cheapside, Manchester, chemical merchant. June 25. Trustee, J. G. Gibson, Official Receiver, Byrom Street, Manchester.

Companies Winding Up Voluntarily

ALEXANDER DUCKHAM & CO., LTD. (in voluntary liquidation).—A general meeting of members will be held at 4, Broad Street Place, London, E.C.2, on Monday, July 19, at 12 noon. L. A. Anderson, Liquidator.

ANGLO-AMERICAN PATENT BOTTLE CO., LTD. (in liquidation).—Creditors' claims on or before July 31 to the Liquidator, Mr. John Baker, Eldon Street House, Eldon Street, London, Chartered Accountant.

MOUNT OXIDE MINES, LTD. (in liquidation).—A meeting of creditors will be held at 19, St. Swithin's Lane, London, E.C., on Monday, June 28, 1920, at 12.45 p.m. E. Davis, W. Clark and H. J. Hill, Liquidators.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.]

BLOOMDALE CHINA CLAY CO., LTD., LONDON, E.C.—Registered June 1, £5,000 debenture to A. Hunter, 115, High Holborn, W.C.; general charge.

NATIONAL FELSPAR CO., LTD., LONDON, E.C.—Registered May 31, £12,000 debentures; general charge.

NEW BRITISH FUEL SYNDICATE, LTD., LONDON, S.W.—Registered May 31, £1,200 debentures, part of £8,000; general charge. *Nil. August 5, 1919.

ROCHDALE ASBESTOS CO., LTD.—Registered May 26, £6,000 debentures; general charge. *£2,200. February 8, 1918.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

BENSON, R. R. (female), 15, Queen Street, Wigan, chemical manufacturer (trading as the General Chemical Co.). £14. 4s. May 3.

BROOKES, T. H., Hitchin, chemist and druggist. £12. May 10.

LUNN, H. N., 402, Victoria Street, Grimsby, chemist. £11. 8s. 1d. May 1.

NOBLE'S DRUG STORES, LTD., 2, Well Street, Cable Street, London, E., druggists. £15. 10s. 1d. April 28.

WOOD, ERNEST, Old Mill House, Haddenham, Bucks, chemist. £20. 5s. 7d. May 11.

New Companies Registered

The following have been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C. :—

ASHBROOKS (1920), LTD., 46A, Market Street, Manchester.—Chemical manufacturers. Nominal capital, £30,000 in 15,000 preference shares and 15,000 ordinary shares of £1 each. Directors: R. H. H. Briggs, 47, Withington Road, Whalley Range, Manchester; R. B. Taylor, 245, Dialstone Street, Stockport (Permanent Directors); A. Hoyle, 22, Talbot Street, Southport; F. Fletcher, Bar House, Lower Bredbury. Qualification of directors, 25 ordinary shares. Permanent directors, 50 ordinary shares.

BARNES & CROMPTON, LTD., 14A, Fishergate, Preston.—Chemists and druggists. Nominal capital, £8,000 in 8,000 shares of £1 each. Directors: H. Williams, Norfolk House, Longton, near Preston; E. H. Bentley, 14, Church Road, Lytham. Qualification of directors, £1,000. Governing directors, £2,000.

BOLTON & HUZARD, LTD.—Drysalters, druggists, chemists, &c. Nominal capital, £1,500 in 1,500 ordinary shares of £1 each. Directors: R. W. Bolton, 88, Trinity Street, Gainsborough; J. W. Huzzard, 88, Trinity Street, Gainsborough.

CARAVEL CO., LTD., 110, Cannon Street, E.C.—Exporters and importers of chemicals, drugs, dyestuffs and textiles. Nominal capital, £1,000 in 1,000 shares of £1 each. Directors: H. Spinrad, Rubins Hotel, Buckingham Palace Road, S.W.; S. D. Hoffman, 66, Fort Washington Avenue, New York, U.S.A.; H. Cooper, President Street, Brooklyn, New York, U.S.A.

CELLACTITE (FOUNDERS), LTD., 5, Victoria Street, Westminster, S.W.—To manufacture materials called Cellactite and Cellestos. Nominal capital, £5,000 in 100,000 Founders' shares of 1s. each. Minimum subscription, 7 shares. Directors: F. J. Commin, 104, Upper Tulse Hill, S.W.; C. H. H. Scott, 49, Birch Road, Oxtou, Cheshire. Qualification of directors, 100 shares. Remuneration of directors, £250.

CHURCH GRESLEY FIRE BRICK & FIRE CLAY CO., LTD., The Fire Brick Works, Church Gresley, Derby.—Manufacturers and dealers in fire clay, &c. Nominal Capital, £25,000 in 2,500 ordinary shares and 2,500 preference shares of £5 each. Directors: W. Aldridge, 14, Regent Street, Church Gresley, near Burton-on-Trent; J. Boddice, Burton Road, Lower Midway, Burton-on-Trent; M. Bourne, Moira Baths, Ashley-de-la-Zouch; T. Carter, Station Drive, Moira, Ashley-de-la-Zouch; S. Whitaker, May Villas, Church Gresley. Qualification of directors, 200 shares.

DI-COLORS, LTD.—Manufacturers and dealers in chemical preparations, cements, oils, paints and colours, &c. Nominal capital, £1,000 in 1,000 shares of £1 each. Directors: T. S. Harris, 4, Lloyds Avenue, E.C.3; W. W. Plowman, Bristol House, Holborn Viaduct, E.C.

EAST ANGLIAN OIL SHALES, LTD., 77, Chancery Lane, W.C.—Dealers and producers of petroleum and other mineral oils. Nominal capital, £1,000 in 1,000 shares of £1 each ordinary. Minimum subscription, 100 shares. Directors: T. P. C. Smith, 4, Pickering Place, St. James' Street, S.W.; C. W. Mosley, 156, Wimbledon Park Road, S.W.; G. H. Barrett, 49, Church Road, Hove. Qualification of directors, £100.

WILKINS, CAMPBELL & CO., LTD.—Wax and chemical manufacturers. Nominal capital, £24,000 in 24,000 shares of £1 each. Directors: W. Calderwood, 83, Hampton Road, Forest Gate, Essex; A. E. Webb, Vincent Lodge, Prestwood, Great Missenden, Bucks.; H. H. Green, Cromer, Brandville Road, West Drayton. Qualification of directors, £1,000. Remuneration of directors, £200.

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Our Dinner to the Pioneers of Aviation of the Royal Air Force; "A New Theory of Air Screws," by A. R. Lane.

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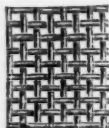
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New "copy" for advertisements must arrive on or before Friday preceding date of publication. Blocks with solid black background are not accepted. Line blocks are preferable to half tones.

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